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PROCEEDINGS OF THE CONFERENCE IN THE MATTER OF POLLUTION OF THE SOUTH PLATTE RIVER BASIN HELD IN DENVER, COLORADO ON OCTOBER 29, 1963

Public Health Service
Washington, D.C.

1963

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CONFERENCE
in the matter of
POLLUTION *of the*
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Denver, Colorado
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U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
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CONFERENCE
in the matter of
POLLUTION *of the*
SOUTH PLATTE RIVER BASIN

Convened on the Call of the
Secretary of Health, Education, and Welfare
Under Section 8 of the
Federal Water Pollution Control Act
(33 U.S.C. 466g et seq.)
Denver, Colorado
Tuesday, October 29, 1963

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Washington, D.C. 20201

I

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Conference in the Matter of Pollution of The South Platte Basin, convened at 9:30 a.m., on Tuesday, October 29, 1963, in the House of Representatives Chambers, State Capitol Building, Denver, Colorado.

PRESIDING:

Mr. Murray Stein, Chief, Enforcement Branch, Water Supply and Pollution Control, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C.

PRESENT:

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE:

Lester H. Klashman, Regional Program Director, Division of Water Supply and Pollution Control, Public Health Service, Department of Health, Education, and Welfare, Denver, Colorado

Dr. Harold F. Clark, Bacteriologist, Division of Water Supply and Pollution Control, Public Health Service, Department of Health, Education, and Welfare, Cincinnati, Ohio

REPRESENTATIVES OF THE FEDERAL GOVERNMENT:

James H. Knights, Bureau of Reclamation, Region No. 7, Denver, Colorado

Albert S. Konselman, United States Bureau of Mines, Denver, Colorado

Dr. Cooper H. Wayman, Research Chemist, United States Geological Survey, Department of the Interior, Denver, Colorado

REPRESENTATIVES OF STATE AND CITY GOVERNMENTS:

Honorable John A. Love, Governor of the State of Colorado

William F. McGlone, President, Colorado State Board of Health

Dr. Roy L. Cleere, Director, Colorado State Department of Public Health

William N. Gahr, Director of Engineering and Sanitation Division, Colorado State Department of Public Health

Jerold D. Wingeart, Manager, Metropolitan Denver Sewage Disposal District #1

Karl G. Williams, County Manager, Jefferson County, Colorado

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REPRESENTATIVES OF INDUSTRY:

Lloyd T. Jensen, Vice President, Operations, Great Western Sugar Company, Denver, Colorado

P R O C E E D I N G S

OPENING STATEMENT

BY

MR. MURRAY STEIN

MR. STEIN: We would like to get this started. This is a magnificent hall, and I can see that it is very subtly constructed. When going down the central aisle, you cannot really slip in here a very sneaky and fast amendment without getting over that obstacle course. I imagine that if you can make it, they figure you are entitled to get your amendment in.

This is something that the Congress in Washington might wish to adopt as a very good technique.
(Laughter.)

The conference is open.

This conference is being held under Section 8 of the Federal Water Pollution Control Act. Under the terms of this Act, the Secretary of Health, Education, and Welfare, is authorized to call a conference of this type when requested to do so by the Governor of a State. In a letter dated July 18, 1963, to the Honorable Anthony Celebrezze, Secretary of Health, Education, and Welfare, Governor John A. Love made such a request. At this point I would like to read into the record Governor Love's letter.

"STATE OF COLORADO

EXECUTIVE CHAMBERS

DENVER

JULY 18, 1963

"Honorable Anthony Celebreeze
Secretary of Health, Education, and Welfare
Washington 25, D. C.

Dear Mr. Secretary:

In accordance with Section 8 of Public Law 660, as amended, I request that you consider favorably assisting the State of Colorado to survey sources of pollution and quality of water in the South Platte River Basin.

Serious pollution problems exist in Adams County and other portions of the South Platte River Basin. River flows have remained static over the years, but domestic and industrial sewage continues to grow with the population. Irrigation return flows tend to increase mineralization.

There is a great need for accurate "information pertaining to the quality of water. Such information is necessary in planning for the water demands re-

lating to human consumption, stock raising, irrigation, food processing, recreation and other uses most of which require water of high quality.

These problems have made demands above and beyond our normal pollution control resources. Should you find yourself in a position to grant this request, I assure you the full cooperation of Colorado agencies in this mutual undertaking.

Sincerely yours,

(Signed) John A. Love, Governor."

On August 16, 1963, Secretary Celebrezze answered this letter and in accordance with the terms of the law a notice of the conference was sent to the official State water pollution control agency, the Colorado State Department of Public Health.

Under the terms of this notice the conference covers all the navigable waters of the South Platte River and its tributaries within the State of Colorado.

The purpose of the conference is to bring together the State water pollution control agencies, the representatives of the Department of Health, Education, and Welfare, and other interested parties to review the existing situation, the progress which has been made, and to lay a basis for future action by all parties concerned, and to give the States, localities, and industries an opportunity to take any remedial action which may be indicated under State and local law.

The conference technique is a rather old one. It is used by many State agencies informally in the normal conduct of their business in the field of water pollution control. The concept of a conference was proposed by the United States Supreme Court as long ago as 1921 in the famous case of New York against New Jersey involving interstate pollution.

I would like to quote from this Court opinion:

"We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and growing populations living on the shores of New York Bay is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court however constituted."

We strongly support the conference technique and we measure our success by the situations which are solved at the conference stage rather than by the court actions we bring.

The representatives of the official agencies are privileged to bring whomever they wish to the conference and have them participate in the conference. However, in accordance with the terms of the Federal Water Pollution Control Act, this is a conference between the official State Water Pollution Control Agency of Colorado and representatives of the Department of Health, Education, and Welfare.

Colorado will be represented by my very old friend, Dr. Roy L. Cleere. Mr. Lester Klashman has been designated conferee for the Department of Health, Education, and Welfare.

Both the States and the Federal Government have responsibilities in dealing with water pollution control problems. The Federal Water Pollution Control Act declares that the States have primary rights and responsibilities for taking action to abate and

control water pollution. It has always been the policy of the Department of Health, Education, and Welfare to give full recognition to this traditional role of the States. The function of the Department is to encourage State action to abate pollution of navigable waters. However, the Department of Health, Education, and Welfare is charged by law with specific responsibilities in the field of water pollution control.

Pollution of navigable waters which endangers the health or welfare of any person is subject to abatement in accordance with the provisions of the Federal Act.

Under the Federal law the Secretary is required, at the conclusion of the conference, to prepare a summary of it which will be sent to the conferees. The summary, according to law, must include the following:

1. Occurrence of pollution of navigable waters subject to abatement under the Federal Act;

2. Adequacy of measures taken toward abatement of the pollution;

and

3. The nature of delays, if any, being encountered in abating the pollution.

Subsequent to the holding of a conference, the Secretary of Health, Education, and Welfare is required to then make recommendations for remedial action to the State agency if such recommendations are indicated.

Now a word about the procedures governing the conduct of the conference. A record and verbatim transcript will be made of the conference. Mr. A. M. Zimmer is making this stenographic report for the purpose of aiding us in preparing a summary, and also providing a complete record of what is said and done here. We will make copies of the summary and transcript available to the official State water pollution control agency of Colorado.

The conference summary and this verbatim record also will be available to interested parties. However, we suggest that copies be obtained through the Colorado Department of Public Health officials. We will give them an ample supply of these documents to make distribution rather than the Federal Government. We have usually found this to be the most satisfactory method so that the lines of communication are kept between the State water pollution control agency and the people in the State interested in the problem.

All the conferees will be called upon to make statements. The conferees, in addition, may call upon participants they have invited to the conference to make statements. At the conclusion of such statements, the conferees will be given an opportunity to comment or ask questions, and at the conclusion of the conferees' comments or questions, I may ask a question or so too. This procedure has proven effective in the past in developing a clear statement of the problem and in reaching agreements and equitable solutions.

At the end of all the statements, we will have a discussion among the conferees and try to arrive at a basis of agreement on the facts of the situation. Then we will attempt to summarize the conference orally, giving the conferees, of course, the right to amend or suggest modifications of the summary.

I would like to indicate that any person making a statement, if called on by one of the conferees, should come up to the lectern and identify himself before making the statement so we may have a complete record.

At this point it is indeed an honor and a privilege for me to call on Governor John A. Love of Colorado, at whose request this conference is called.

Governor Love.

(Rising Applause.)

STATEMENT OF

THE HONORABLE JOHN A. LOVE

GOVERNOR

STATE OF COLORADO

GOVERNOR LOVE: Thank you.

Mr. Stein, Ladies and Gentlemen: Of course, I am pleased to see an attendance and participation of this size and representative character.

As Mr. Stein has stated, the purpose of this conference is to begin, although there have been some beginnings made already, to define the problem of pollution of the Platte, and then to work towards a solution.

I have long been convinced that Colorado's greatest asset is Colorado itself, and above all we must for many reasons preserve and protect it. High on the list, of course, are the necessary efforts to retain our water sources, our rivers and our streams, in pure and unsullied, uncontaminated state.

Shortly after coming into office, I was increasingly concerned that we had not moved fast enough or well enough in the past to accomplish this goal. Of course, this was brought to my attention by situations such as exist at Barr Lake, which has been much publicized, and by other occurrences.

I am convinced that our statewide statutes are not completely adequate to deal with this problem, and I believe that later in the conference there is to be some mention of that by the President of the State Board of Health.

But first on the Platte, of course, the problem is to define what are the contaminants and what are the sources of these contaminants. I thought this was a simple problem when I first discussed it with Dr. Cleere, and I found that it is not at all simple. In order to develop the kind of effective program which we will need it requires a very extensive analysis and survey. I am sure such a survey will grow out of this.

Some of the sources of contamination, of course, are obvious to us. There is raw sewage being dumped into the South Platte at this very moment, but the solution, I am afraid, in this area depends simply on the time it will take to complete the Metropolitan Sewage District facilities.

Other sources have not been determined. We will look toward the kind of survey which will develop them.

Mr. Stein has said this is primarily a State problem in which we are going to take State action, but we do indeed welcome the fine cooperation and help from the Department of Health, Education, and Welfare.

I am sure that you will find this conference productive. I won't be able to stay. I do hope to get back later in the day.

Thank you very much.

(Applause.)

MR. STEIN: Thank you, Governor.

You know, I would like to say, Governor, that I was authorized when we came out here to make available for this fiscal year up to $175,000 for the purpose of assisting Colorado in their problems, and I wanted you to know that before you left.

GOVERNOR LOVE: It will be most gratefully received, I assure you.

(Applause.)

MR. STEIN: May we now call on Mr. William F. McGlone, President of the Colorado State Board of Health.

Mr. McGlone.

STATEMENT OF

WILLIAM F. McGLONE, PRESIDENT

COLORADO STATE BOARD OF HEALTH

Denver, Colorado

MR. MC GLONE: Thank you, Mr. Stein.

First of all, I am Chairman of the State Board of Health, and I would like to thank Governor Love for inaugurating this conference and this survey of the South Platte River and its pollution problems. Particularly I do wish to thank the Public Health Service officials for their cooperation, which has already been evidenced by the statement that $175,000 has been made available from the Federal Government for assisting in this study and survey.

Speaking in behalf of the State Board of Health, we are pleased that this conference on the South Platte River is being held. Persons familiar with the Denver metropolitan area and the counties in northeast Colorado are well aware of the critical polluted condition of the South Platte River. The State Board of Health is even more acutely aware of this situation, as we have had the legal responsibility to attempt to abate the pollution. While we feel progress has been made, especially concerning the pollution of the river with domestic sewage, we are the first to admit that not nearly enough has been accomplished, and there is much remaining to be done. We see this conference as another step toward eventualy pollution abatement and as such, we give it our wholehearted support.

As I have indicated, the Board of Health is vitally concerned and deeply involved in all water pollution problems in Colorado. The 1947 State Department of Public Health Law provides that among the several powers and duties of the State Board of Health it shall issue such orders, adopt such rules and regulations and establish such standards as the Board may deem necessary to enforce the public health laws of this State. The Board adopted various standards for sewage effluent during the years; each set of standards endeavoring to provide more effective controls against stream pollution. When there appeared to be some question as to the authority of the Board to adopt standards and regulations, the 1957 Legislature gave support to control measures by writing into the Statutes the specific standards for sewage effluent being discharged into the surface waters of the State. It is these statutory standards that the Engineering Section of the State Department of Public Health has been using as guide lines, and that have been the basis for the Board's enforcement procedures in recent years.

I should like to outline the procedure which must be followed in any Board action involving enforcement of standards. The personnel of the State Health Department collect evidence as to violations which may exist -- the method and frequency of the sampling of the effluent is quite specifically stated in the law. The Executive Director of the Department makes tentative findings, based on laboratory reports, and notifies the community or industry that a violation exists and a hearing is scheduled before the State Board of Health.

From the evidence presented at the hearing, the Board may sustain or dismiss the findings of violation. If the findings are sustained, the Board orders abatement of the violation and usually grants a reasonable time for abatement. At a future date, the Board holds another formal hearing at which the violator is required to present evidence

of complying with the Board's order. Should such evidence not be satisfactory to the Board, the matter may be referred to the local District Attorney or the Attorney General for legal action. The respondent, however, has the right of appeal to the District Court from the Board's decision, under our rules of civil procedure.

I am sure you are well aware of the difference between theory and practice as it relates to water pollution control. Abating the violation, in most instances, involves the installation or expansion of a sewage treatment facility -- a bond issue for financing such construction is dependent on the vote of the taxpayers, and often the bond issue is defeated. Under our present law, neither the Board of Health nor the Court has power to bring about the construction of the necessary facilities. There is a vital need for legislation which will provide the legal mechanism by which orders of the Board and/or the Court can be made more effective.

The Public Health Law of Colorado is very specific in delegating the power and duty to the State Department of Public Health to enforce the public policy of the State with reference to the pollution of waters by human excreta and human wastes. The Health Department's authority in water pollution control should be extended by specific statutory authority to control pollution by industrial and agricultural wastes which have a deleterious effect on water quality. There is a need to provide a broader framework for water quality control through classification of streams and the establishment of reasonable standards applicable to particular industries, the composition of their effluent, proximity to a water source, volume of flow and the use to which the water is to be put.

A matter of concern to the State Board of Health is the fact that we are called on to make extended investigations, hold formal hearings and make findings of violations. This signifies that much time and effort of the staff of the State Department of Public Health and the Board of Health is being spent in an effort to correct pollution practices which never should have been allowed to occur. A major cause of the problem in Colorado is the rapid population growth and the expansion of industrial and suburban development. Many cities and sanitation districts have installed sewage treatment facilities which were adequate for a comparatively static population at the time the plant was installed. Within the last several years, many of these communities have experienced sharp increases in population and industrial expansion, with the result that the existing sewage treatment facilities no longer can provide proper treatment and large quantities of raw or inadequately treated sewage are discharged directly into the stream.

The practice of establishing large housing developments outside of existing municipalities compounds sewage disposal problems. A sanitation district may be formed for the first subdivision of 50 or 100 new homes, and an independent plant or a lagoon may be constructed, or a contract may be made for a nearby treatment plant to receive the wastes of the subdivision. The 50 or 100 homes originally constructed find eager buyers, and the developers decide to open another tract, and then another, and at times an entire complex of housing, industrial, commercial and community developments. Unfortunately, there is a great weakness in both our public health laws and zoning laws in that there is no assurance, other than the word of the developer, that there will be adequate sewage treatment facilities available.

We need a revamping of laws or the establishment of legally supported regulations which will prevent inadequate sewage treatment -- or, stating it in more positive terms, we need control measures which will make it mandatory to provide adequate facilities before homes can be sold or new community complexes developed.

I wish to state, parenthetically, that I feel we should have similar controls to assure that there will be an adequate, acceptable water supply for these highly

developed real estate projects, and that water treatment facilities will be of the size and efficiency so as to provide water which meets the drinking water standards of the State Board of Health. I think we are remiss if we do not take steps which will require approved water supplies and sewage treatment methods before homes and other establishments are built, sold and occupied, rather than trying to obtain corrective measures after the violations have occured. Proper controls and planning can be more effective before the fact and, I feel, will enhance rather than hinder community development.

We of the State Department of Public Health do rely in large measure on individual and community education so that an enlightened public will accept its responsibility for voluntary measures which will result in the abatement of water pollution. However, we must be realistic and recognize that there will continue to be violations which will require enforcement proceedings which are authorized and substantiated by adequate legal power to get the job done. You will be hearing presentations at this conference of the nature and scope of the pollution of the South Platte River from speakers who are far more qualified to discuss the matter from technical viewpoints.

I would urge, in concluding, however, that you do not lose sight of the need for legal provisions which will assure compliance with whatever recommendations may be forthcoming in your deliverations today or in the future.

(Applause.)

XXXX

MR. STEIN: Thank you, Mr. McGlone

That was indeed a comprehensive and penetrating paper, and I think in that short statement all the real critical problems facing Colorado, as well as the rest of the nation, in water pollution control, were covered.

I wish to suggest that when you get a copy of the transcript, you get a copy of the statement.

Some of the major points I got, for example, were that you made this problem seem excessively simple, but when you attempt to evaluate the causes, the casual relations and intereference with the users and water pollution control, you get a factual situation that is as complicated as any antitrust case. I think both of these areas are about the most complicated one can find.

Another key point, that water pollution control is one of the major problems of the latter part of the 1960's, or, I might say, of the 20th century, is how do you, when all cooperative efforts have failed, try to get one public subdivision to do something which they may not wish to do at that particular time?

I think the precedents are fairly well established for moving against individuals and industries, but it is very, very difficult, as Mr. McGlone points out, if a bond issue is defeated, to get the public, to get a municipality, or to get a political subdivision to move.

Mr. McGlone states that in Colorado legislation is needed to move towards this. I might say this is not an insurmountable task, because this has been done many, many times.

Another point that Mr. McGlone makes is that often sewage treatment plants are constructed for a static population or built for minimum conditions, and sometimes I wonder why this happens in this field and not in other fields.

Up to a few years ago, living in Virginia, we were going back across to Washington, D. C., over a bridge which was supposed to be obsolete fifty years ago. Yet, the engineers overbuilt that bridge, so it is still in use, or could be in use.

If you look at your highways and see how those are built, and then look at the sewage treatment plants and see how fast they become obsolete, I wonder if we should not have some more foresight.

The next point, of course, I think, as Mr. McGlone points out, is this problem of prevention before pollution gets started, and there we have a difficult problem to roll back. Economies are based on a status quo and you, almost in many cases, have a vested right in pollution. The key to this, I think, as Mr. McGlone points out, is to improve the effective State law.

Again, may I commend you, Mr. McGlone. I think that was as good a statement as I have heard.

You see up here Dr. Roy Cleere, Howard Stokes, who is the Executive Assistant to Governor Love, and Mr. William Gahr, the Sanitary Engineer who is in charge of the State water pollution control program.

Before we go on, I would like to introduce two observers from our neighboring State of Nebraska, Mr. Sutton, the Chairman of the Nebraska Council -- Mr. C. Neil Sutton -- and Mr. Samson. Mr. Samson used to be a member of the President's Water Pollution Control Advisory Board.

I note Mr. Ted Filipi, the Sanitary Engineer in Charge of Water Pollution Control, is here from Nebraska too. Mr. Filipi, would you stand for a moment?

I think Mr. R. L. Coffman of the Wyoming water pollution control agency is here. Mr. Coffman, will you stand? Thank you very much.

With this, I would like to call on Mr. Klashman, the Regional Program Director, for the presentation of the statement of the Department of Health, Education, and Welfare.

Mr. Klashman.

STATEMENT OF

LESTER M. KLASHMAN

REGIONAL PROGRAM DIRECTOR

DIVISION OF WATER SUPPLY AND POLLUTION CONTROL
PUBLIC HEALTH SERVICE
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
DENVER, COLORADO

MR. KLASHMAN: We are pleased to participate in this conference with Dr. Cleere and Mr. Stein.

I should like to open our HEW presentation by introducing some of our special colleagues who are here attending this conference.

First, Dr. Henry Kassel, Regional Director for Health, the Rocky Mountain Region.

Mr. Detmer, our Regional Attorney.

Mr. Harold F. Clark, Technical Consultant for our Enforcement Branch.

Dr. William Ingram.

Mr. Hayse Black, our Industrial Waste Consultant.

Mr. Frank Rainwater from our Washington office.

In addition, I would like to introduce Mr. Martin Bauer, who will be working in the South Platte, and who is in charge of this activity.

Several of the agencies have indicated that they would like to make statements, and we will call on them later. These are:

Mr. J. H. Knights of the Bureau of Reclamation.

Dr. Cooper H. Wayman of the United States Geological Survey.

Albert F. Konselman, United States Bureau of Mines.

A number of other special agencies are here who, I understand, do not plan to make statements. If you do, I wish you would so indicate.

Captain Sebert L. Trail of the Rocky Mountain Arsenal, United States Army.

G. A. Franz, Jr., Bureau of Mines.

Robert Brennan, United States Geological Survey, Water Resources Division.

C. W. Bullach, Bureau of Outdoor Recreation, United States Department of the Interio.

M. J. Greer, United States Bureau of Reclamation, Region No. 7

E. A. Jarecki, also of the Region No. 7 office of the Bureau.

William H. Teller, Bureau of Land Management, Department of the Interior.

Richard C. Cowdery, United States Bureau of Public Roads.

Fred O. Case, Soil Conservation Service.

Robert W. Gardner, United States Forest Service.

L. M. Grow, United States Atomic Energy Commission, Rocky Flats Plant.

Thank you very much, gentlemen. If any of the rest of you wish to make statements, I wish you would let me or let Mr. Bauer know, and we will call on you later.

I should now like to call on Mr. Harold Clark of the Division of Water Supply and Pollution Control of the Public Health Service to make an opening statement for us.

MR. STEIN: Thank you, Mr. Klashman.

While Mr. Clark is coming up, I just want to say we have one advantage in working with a big group of engineers as we have.

In back of us we have a lighted board and I understand we will attempt to synchronize Mr. Clark's presentation with the board, and have these lights go on which will indicate various areas and aspects of the stream or the problem about which he is talking. Some of the lights indicate municipalities, some industries, and this hopefully will be synchronized with Mr. Clark's talk.

Mr. Clark.

STATEMENT OF

MR. HAROLD F. CLARK, BACTERIOLOGIST

DIVISION OF WATER SUPPLY AND POLLUTION CONTROL
PUBLIC HEALTH SERVICE
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CINCINNATI, OHIO

MR. CLARK: Mr. Chairman, conferees: I would like to start with a description of the area.

The South Platte River drainage encompasses 24,300 square miles, of which 19,450 is contained within the State of Colorado, and 2,050 and 2,800 square miles, respectively, in the States of Wyoming and Nebraska. The South Platte River originates on the east side of the Continental Divide in Central Colorado, flows northeast across the State of Colorado, and joins the North Platte River at North Platte, Nebraska. Principal tributaries, as you can note from the map, of the South Platte River are Bear Creek, Cherry Creek, Clear Creek, St. Vrain Creek, Big Thompson River, Cache La Poudre River, Crow Creek, and Lodgepole Creek.

The primary source of native surface runoff in the Basin originates from melting snowpack in the mountainous area. The water resources of the South Platte Basin consist of surface and ground water and transmountain diversion waters. Approximately 1.2 million acre-feet of native surface water is available each year. Transmountain diversions are in the order of 0.3 million acre-feet of water per year. Ultimate diversions are expected to approximate 0.6 million acre-feet on an annual basis. Ground water supply in the Basin is used extensively for land irrigation. Surface water resources in the South Platte Basin have been greatly over-appropriated for irrigation use. Lowest surface water flows are expected in the Basin during the winter period. In the summer, critical flow conditions occur at many points on Basin streams where agricultural diversions may use all, or nearly all, of the available streamflow.

The 1960 population of the Basin was slightly in excess of one million persons, of which 92 percent were within the State of Colorado, and 4 percent each within Wyoming and Nebraska. The population has increased at a very rapid rate. From 1940 to 1950 it increased from 660,000 to 840,000 with an estimate for 1963 of 1,160,000 persons.

The population of the Denver Metropolitan area has been particularly remarkable with an increase from 1950 to 1960 of 499,000 to 804,000 and a further rise to over 1,000,000 persons as of mid-1963. The Denver Metropolitan area contains about 85 percent of the total Basin population and is an extremely important manufacturing and trade center for a large part of the Rocky Mountain Region. Other centers of population in the Basin, as of 1960, include Boulder (37,718 population), Fort Collins (26,596 population), and Greeley, Colorado (26,314 population), and Cheyenne, Wyoming (43,505 population). Additional information on census population of all cities and towns of consequence within the Basin for the years 1940, 1950, and 1960, is given in Appendix A.

MR. STEIN: Mr. Clark, do you want the appendix to appear in the report?

MR. CLARK: I would like to have it appear in the record.

MR. STEIN: Without objection, that will be done at this point.

(APPENDIX A IS AS FOLLOWS:)

Appendix A

TABLE NO. 1
SOUTH PLATTE RIVER BASIN - POPULATION OF MUNICIPALITIES

Municipality	Population - U. S. Census		
	1940	1950	1960
COLORADO			
Arvada	--	--	19,242
Ault	761	866	799
Aurora	3,437	11,421	48,548
Berthoud	811	867	1,014
Black Hawk	289	166	171
Boulder	12,958	19,999	37,718
Brighton	4,029	4,336	7,055
Broomfield Heights	--	--	4,535
Brush	2,481	2,431	3,621
Castle Rock	580	741	1,152
Central City	706	371	250
Commerce Town	--	--	8,970
Crook	236	259	209
Dacono	296	258	302
Deer Trail	387	421	764
Denver	322,412	415,786	493,887
Eaton	1,322	1,276	1,267
Edgewater	1,648	2,580	4,314
Empire	174	228	110
Englewood	9,680	16,869	33,398
Erie	1,019	937	875
Estes Park	994	1,617	1,175
Evans	792	862	1,453
Fairplay	739	476	404
Firestone	262	297	276
Fort Collins	12,251	14,937	26,596
Fort Lupton	1,692	1,907	2,194
Fort Morgan	4,884	5,315	7,379
Frederick	652	599	595
Georgetown	391	329	307
Glendale	--	--	468
Golden	3,175	5,238	7,118
Greeley	15,995	20,354	26,314
Grover	137	146	133
Hillrose	177	190	157
Hudson	295	365	430
Idaho Springs	2,112	1,769	1,480
Iliff	222	235	204
Johnstown	961	897	976
Julesburg	1,619	1,951	1,840
Keenesburg	284	432	409
Kersey	268	304	378
Kiowa	195	173	195
Lafayette	2,052	2,090	2,612
Lakewood	--	--	19,338
LaSalle	755	797	1,070

TABLE NO. 1(Cont'd)

Municipality	Population - U. S. Census 1940	1950	1960
COLORADO (Cont'd)			
Littleton	2,244	3,378	13,670
Longmont	7,406	8,099	11,489
Louisville	2,023	1,978	2,073
Loveland	6,145	6,773	9,734
Lyons	654	689	706
Mead	191	186	192
Merino	259	209	268
Milliken	531	510	630
Morrison	216	306	426
Mountain View	711	878	826
Nederland	384	266	272
Nunn	190	182	228
Orchard	865	956	1,021
Ovid	687	664	571
Palmer Lake	269	263	542
Peetz	207	232	218
Pierce	343	372	424
Platteville	561	570	582
Sedgwick	373	332	299
Silver Plume	139	136	86
Sterling	7,411	7,534	10,751
Thornton	--	--	11,353
Wellington	465	541	532
Westminister	534	1,686	13,850
Wheat Ridge	--	--	21,619
Windsor	1,811	1,548	1,509
WYOMING			
Albin	160	208	172
Burns	253	216	225
Cheyenne	22,474	31,935	43,505
Pine Bluffs	771	846	1,121
NEBRASKA			
Chappell	1,093	1,297	1,280
Kimball	1,725	2,048	4,384
North Platte	12,429	15,433	17,184
Ogallale	3,159	3,456	4,250
Paxton	551	606	566
Potter	387	421	554
Sidney	3,388	4,849	8,004
Sutherland	862	948	867

MR. CLARK: The 17-county area of the State of Colorado within the South Platte River Basin has experienced great industrial and commercial expansion since 1940. Major income producing occupations in order of importance within the area are: Wholesale trade, retail sales, manufacturing, construction, agricultural sales, and services. The area outside the four-county Denver Metropolitan area has agriculture as its principal activity. In 1959, 984,000 acres within the Basin were irrigated, of which 913,000 acres were in the State of Colorado and 27,000 and 44,000acres respectively in the States of Wyoming and Nebraska. Comparable data for 1949 indicates that 984,000 acres were also under irrigation.

Principal irrigated crops are alfalfa, corn, sugar beets, barley, dry beans, oats, winter wheat, spring wheat, potatoes, and other miscellaneous vegetables. The miscellaneous group includes lettuce, cabbage, radishes, peppers and onions, as examples of vegetables which may be consumed without cooking.

The livestock production activity in the middle and lower portions of the South Platte River Basin is one of the largest in the United States. This activity varies from irrigated mountain meadow pasture and dry rangeland to intensified dry-lot feeding.

WATER USES

An estimated 3.7 million acre-feet of water per year, including reuse, are supplied at the present time from surface and ground sources for domestic use, industrial supplies, and for irrigation. These waters are also used for fishing, swimming, and other recreational purposes; for livestock watering; and for production of hydroelectric power.

Provision for adequate municipal water supply to serve needs of the Basin has been a major problem. Data collected over the period 1960-1963show that surface water is used exclusively to supply 174 million gallons per day or 194,000 acre-feet of water annually to a population of 795,000. Approximately 80 percent of these domestic water consumers are supplied through the Denver public system. Ground water sources provide approximately 18 million gallons per day or 20,000 acre-feet of water annually to serve a total municpal population of 90,000. A combination of surface and ground water supplies provide 32 million gallons per day or 36,000 acre-feet annually for the needs of a population of 155,000. Excluding Denver, there are approximately 150 separate municipal water supplies, in large part serving small cities and towns.

In summary, surface and ground water sources are relied upon to deliver 224 million gallons per day or 250,000 acre-feet of water annually to satisfy a total municipal population of approximately 1,040,000. The average per capita consumption of both surface and ground water does not vary greatly within the Basin. This rate is about 215 gallons per capita per day.

The industries of the South Platte Basin rely largely upon municpal supplies to provide water of suitable quantity and quality. However, about 25 of the major industrial users, including the sugar beet factories, have individual supplies derived from ground water or irrigation canals, or a combination of both. The water requirements of industry not connected to municipal systems are estimated as more than 50,000 acre-feet annually.

Agriculture is by far the largest user of water in the Basin. In 1944 limited data indicated that 2.1 million acre-feet of surface water was used for irrigation. (This includes reuse.) Since the completion of the Colorado-Big Thompson Project in the early 1950's, additional transmountain diversions in the order of 150,000 - 200,000

acre-feet annually have been made available principally to irrigation interests in the South Platte Basin. It is expected that ultimate diversions from this system will total 260,000 acre-feet annually.

Irrigation also uses large quantities of ground water. A report by the Colorado Water Conservation Board indicates that in 1956, 5,000 pumps furnished one million acre-feet of ground water to 550,000 acres in the South Platte River Basin in Colorado.

The Bureau of Reclamation estimates the total average annual depletions in the South Platte Basin over the period 1930-1949 was 1.14 million acre-feet.

Water resources of the South Platte River Basin have great recreational value. In 1961 tourist trade gross business was valued at 408 million dollars for the State of Colorado. A significant portion of this trade is credited to the Basin area within Colorado. In their natural state headwater streams support an excellent fishery; however, pollution has resulted in depletion of the fishery resources of the Basin. The Colorado Fish and Game Department over the years has maintained fish hatcheries and an active restocking program to increase game fish populations. During 1962, about 1.5 million rainbow and brown trout of legal size to catch, and I believe that is over 6 inches, were planted in waters of the South Platte River Basin. A number of large water storage reservoirs provide opportunities for fishing, swimming, boating, water skiing, and other water-based activities. The mountain region, including Rocky Mountain National Park, attracts millions of tourists each year.

Use of Basin waters for livestock watering is important. Production of hydroelectric power on the headwaters of tributary streams is vital to the economy of the area. Waterways of the Basin also support the needs of large numbers of wildlife, including large and small game and migratory fowl.

WASTE SOURCES AND POLLUTION EFFECTS

Municipalities contribute a large and increasing proportion of the total Basin pollutional load. In 1950, the total population served by municipal sewerage in the Basin was estimated at 710,000. The untreated municipal waste load was increased to a population equivalent of 890,000 (based on organic biochemical oxygen demand load) by the addition of industrial wastes. Treatment of these wastes in 1950 reduced the total municipal load by 46 percent to a population equivalent of 480,000 discharged to Basin streams.

Corresponding data collected over the period 1960-1963 indicates total untreated municipal wastes equal to a 1,610,000 population equivalent from a served population of 1,160,000. Treatment was effective in reducing this pollution by 44 percent to a population equivalent of 910,000. These waste factors have nearly doubled over the last 10 to 13 years. The Denver Metropolitan area is the major source of municipal pollution. Untreated discharges are approximately equal to a population equivalent of 1,240,000, which are reduced by treatment to a residual population equivalent of 770,000. Recent information on individual municipal and industrial waste discharges is given in Appendix B.

Mr. Chairman, I would like to have Appendix B introduced in the record.

MR. STEIN: Without objection, it will be made a part of the record at this point.

(APPENDIX B IS AS FOLLOWS:)

APPENDIX B

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TABLE NO. 1 - BASIC DATA ON SOURCES OF POLLUTION
SUB-BASIN NO. 1: HEADWATERS TO LITTLETON, COLORADO

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
Castle Rock, Colo.	1	1,152	1,152E	Municipal	Lagoons	160E
Louviers, Colo.	2	300	300E	Domestic	Secondary	120E
Martin Company near Littleton, Colo.	3	12,000 day 1,000 night	7,000E	Domestic wastes from Titan Missile Production 1/	Secondary	480E
Mineral Concentrates and Chemicals - Tarryall Mill near Lake George, Colo.	4	5 employees	--	Beryllium ore upgrading by flotation	Tailings pond for mill waste-septic tank for employees	None
E. I. DuPont de Memours and Co., Inc., Louviers, Colo.	5	220 employees	--	Mfgr. of explosives	Septic tank for employees-cooling waters to Plum Creek-wash waters to lagoon which may overflow to Plum Creek during high runoff from the plant site	N.A.

1/ After separate storage treatment, acid and alkaline wastes pass through a flocculator, clarifier, and then two detention basins operating in parallel. The clarified effluent goes to Brush Creek via 12" and 26" lines. Sludge from the clarifier and basins is concentrated in two lined ponds until it is hauled to earth ponds on company land. Test stand cooling water goes to an underground tank where treatment of any spilled fuels may be accomplished. This tank discharges to a lined pond and then Brush Creek through a submerged outlet.

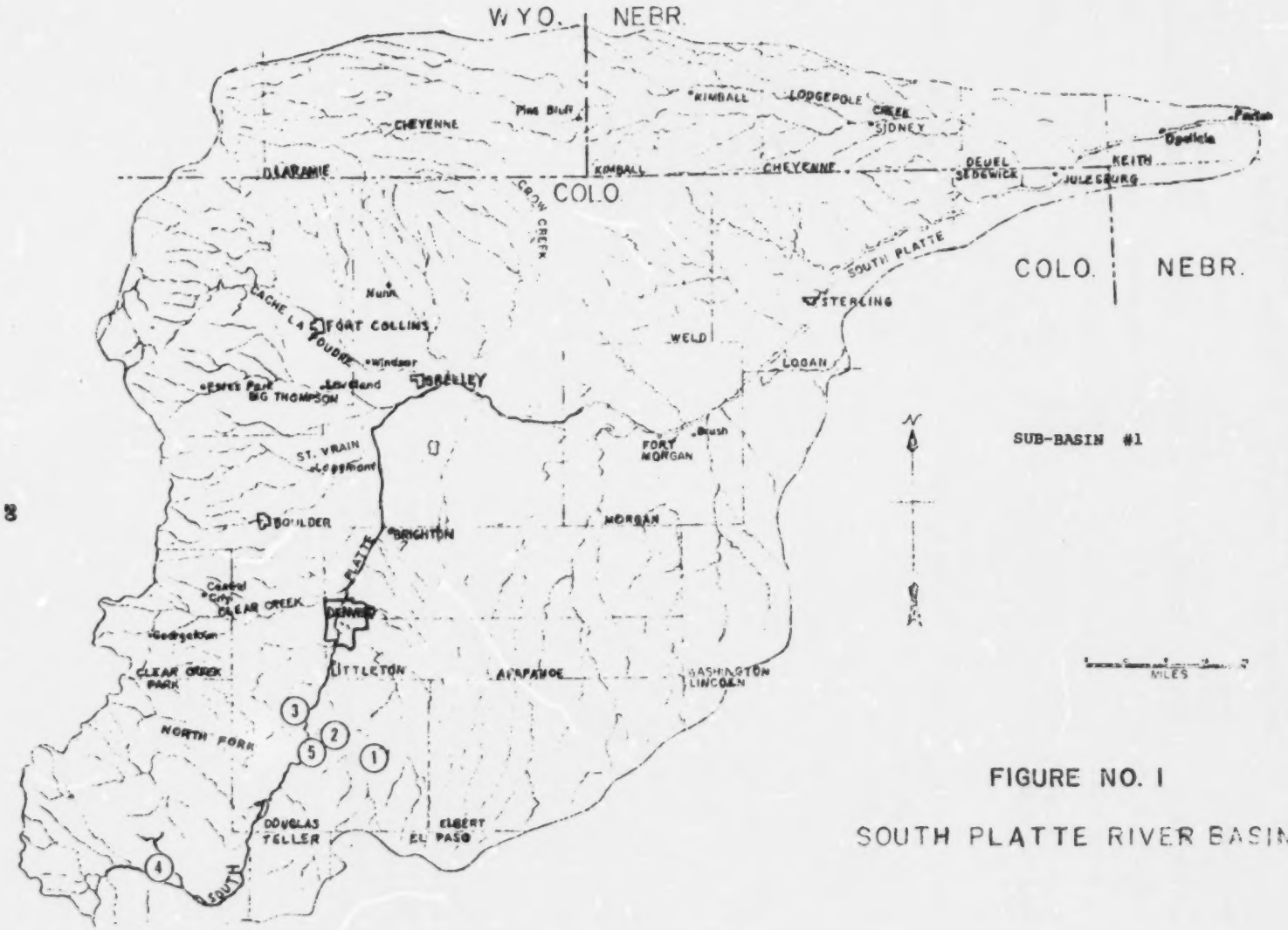

FIGURE NO. 1

SOUTH PLATTE RIVER BASIN

TABLE NO. 2 - BASIC DATA ON SOURCES OF POLLUTION
SUB-BASIN NO. 2 - LITTLETON, COLORADO, TO BELOW
THE NORTH DENVER INDUSTRIAL COMPLEX

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
Aurora, Colo.	2	47,000	47,000	Municipal	Secondary	16,500E
Arvada, Colo.	3	24,700	24,700	Municipal	Secondary	17,000E
Baker, W.&S.D.	4	17,100	17,900	Municipal	Secondary	7,200E
Clear Creek Valley, S. D.	5	7,600	12,000E	Municipal	Secondary	7,650E
Fort Logan State Mental Hospital	6	500	500	Domestic	Secondary	35E
Fitzsimons Army Hospital	7	4,000	4,000E	Domestic	Secondary	840E
U. S. Army Rocky Mountain Arsenal	8	Undet.	Undet.	Undet.	Evaporation Lagoon	Undet.
Federal Correctional Institution	9	585	585E	Domestic	Secondary	140E
Buckley Field (Colo. Air National Guard)	10	Undet.	Undet.	Domestic	Secondary	Undet.
Denver, Colorado North Side Plant	11	554,000	900,000E	Municipal	Primary	630,000E
Denver, Colorado East Plant	12	17,500	22,500E	Municipal	Secondary	10,800E
Englewood, Colorado	13	52,000	52,000E	Municipal	Secondary	11,300E
Evergreen S. D. Evergreen, Colo.	14	230	230E	Municipal	Secondary	40E
Fruitdale S. D.	15	1,200	1,200E	Municipal	Primary	780E
Golden, Colorado	16	8,400	77,500E	Municipal & Brewery	Secondary	51,000E
Georgetown, Colo.	17	200	200E	Domestic	None	200E
Glendale, Colorado	18	500	1,450E	Municipal	Secondary & Lagoons	No direct discharge
Idaho Springs, Colo.	19	2,500	2,500E	Municipal	Primary	1,750E
Littleton, Colorado	20	14,600	14,600E	Municipal	Secondary	2,130E

TABLE NO. 2(Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
Mountain View School for Girls	21	150	150E	Domestic	Septic Tank & Lagoon	65E
Northwest Lakewood, Colorado	22	17,400	17,400E	Municipal	Primary	11,600E
South Lakewood, S.D.	-	8,600	8,600E	Municipal	Secondary	2,100E
North Washington W&S.D.	23	11,300	75,750E	Municipal	Secondary	35,300E
South Adams Co. W&S.D.	24	15,300	15,300E	Municipal	Secondary	1,450E
Thornton, Colorado	25	29,000	29,000E	Municipal	Secondary	20,000E
Wheatridge S.D.	26	23,000	23,000E	Municipal	Secondary	4,850E
Westminster S.D.	27	14,500	15,250E	Municipal	Primary (Secondary Plant operating as a primary plant)	9,900E
Broderick-Wood Products, Denver	28	33 employees	Undet.	Wood Preserving	Septic tank for employees. Oil Separator and lagoon for industrial waste	None
Capitol Rendering Co., Denver	29	24 employees	Undet.	Rendering	Septic tank for employees Sedimentation basin for industrial waste	Varies 720 Min. 7200 Max.
Continental Oil Co.	30	108 employees	Undet.	Oil Refinery	Septic tank for employees. Oil separation for industrial process area drainage wastes. Biological oxidation for removal of phenols and sulfides in sour water. Caustic wash is sold for plastics manufacture.	409E

TABLE NO. 2 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P. E. Waste Before Treatment	Nat re of Waste	Treatment Provided	P. E. Discharge to Watercourse
Empire Petroleum Co., Denver	31	14 employees	Undet.		Septic tank for employees. Oil separation for industrial waste.	750E
Koppers Co., Inc. Denver	32	12 to 70 employees	Undet.	Wood Preserving	Septic tank for employees. Oil separation and ground discharge for industrial waste.	None
Oriental Refining Co., Denver	33	15 employees	Undet.	Oil Refinery	Septic tank for employees. Three oil separators and two earth ponds for oil separation.	420E
Sundstrand Trubo-Division, Denver	34	1200 employees	Undet.	Aircraft and Missile Components	All Wastes discharged to Baker W&S.D. sewers.	None
Skelly Oil Co. Adams City	35	4 employees	Undet.	Oil Refinery	Septic tank for employees. Seepage pit for industrial wastes.	None
Tenneco Oil Co.	36	42 employees	Undet.	Oil Refinery	Septic tank for employees. Oil separation for industrial waste.	440E
Packaging Corp. of America, Denver	37	78 employees	Undet.	Paperboard Manufacturer	Septic tank for employees. Screens and chlorination for industrial wastes.	17,600E
Denver Municipal Airport (Stapleton Field)	38	N. A.	N.A. Oils, CN, Phenols	Aircraft Maintenance	Sanitary sewage to East Denver Plant; other wastes discharged to Sand Creek.	N.A.

TABLE NO. 2 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
American Smelting and Refining, Denver	39	125 employees	Undet.	Electrolytic Metal Refining	Sanitary sewage to Denver sewers. Industrial waste to settling pond.	None
Denver-Chicago Trucking Co.	40	None	None	Acid and Caustic Tank Truck Wash Water	None	None
Glory Hole, Inc. Central City	41	2 to 20 employees-seasonal-Apr. to Nov.	None	Mining and milling various metallic ores	Septic tank for employees. Tailings pond for industrial waste	None
Rocky Mountain Dairy Idaho Springs	42	2 employees	Undet.	Milk Production	Septic tank for employees. Cesspool for industrial waste	None
Coors Porcelain Co.	43	950 employees	None	Ceramics Mfgr. and fuel element research	Sanitary sewage to Golden sewers; vacuum filtration of some industrial wastes before discharge to Golden sewers. Some contaminated wastes retained for special disposal. Some direct discharge of floor and mill wash water.	None
Adolf Coors Co.	44	Undet.	Undet.	Brewing	Sanitary and industrial wastes discharged to Golden sewers.	None

TABLE NO. 2 (Cont'd)

Municipality or Industry	Map Ident. Number	Severed Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
Sigman Meat Co., Denver	45	160 employees	Undet.	Meat Packing	Sanitary sewage to Clear Creek Valley W&S.D. sewers; industrial wastes sent to a grease flotation tank and SWECO separater before discharge with sanitary sewage.	None
Larsen-Kilpatrick Co., Englewood	46	2-3E	None	Waste chemicals from boiler treatment	Lagoon with discharge to Englewood STP effluent line. Septic tank for employees.	None

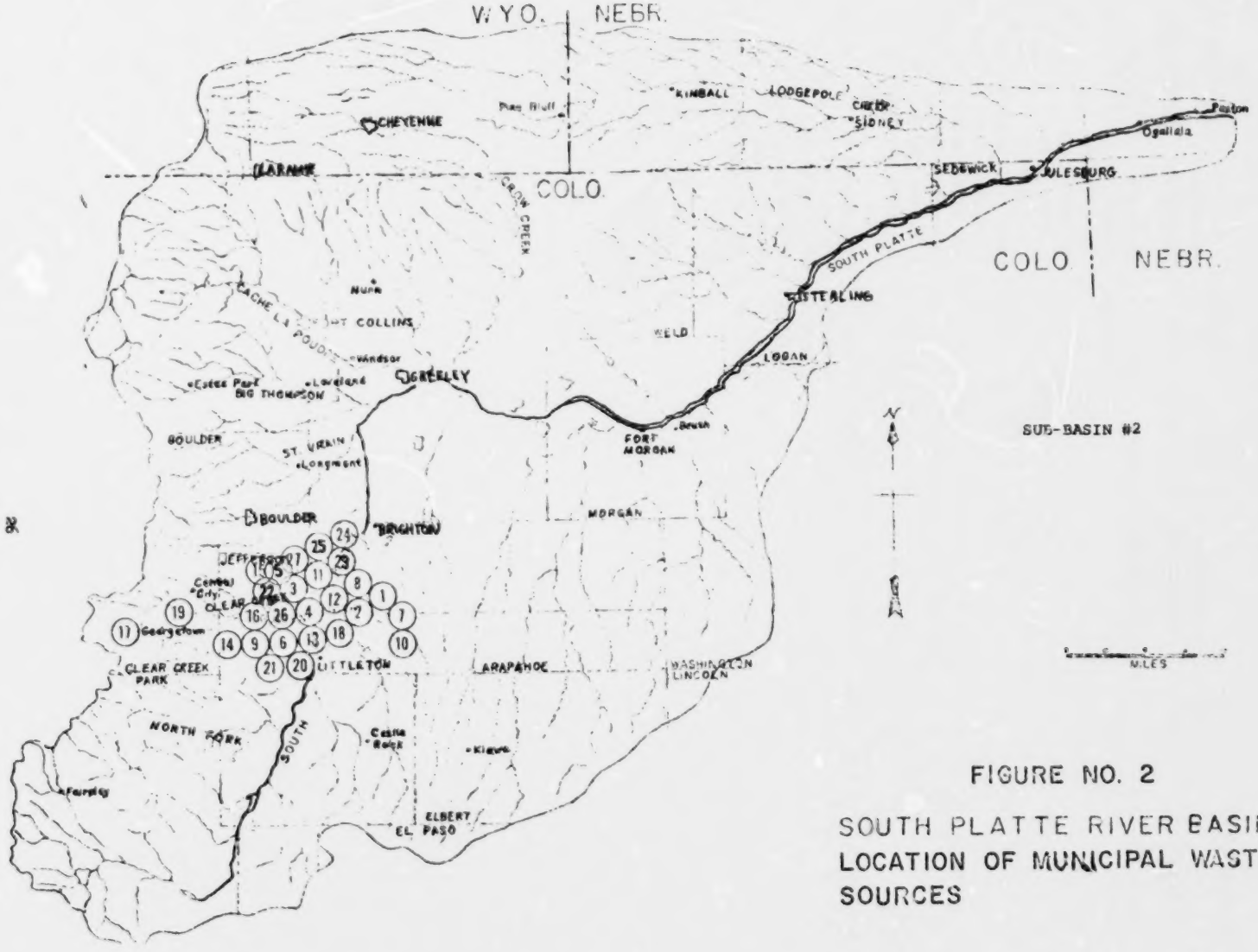

FIGURE NO. 2

SOUTH PLATTE RIVER BASIN
LOCATION OF MUNICIPAL WASTE SOURCES

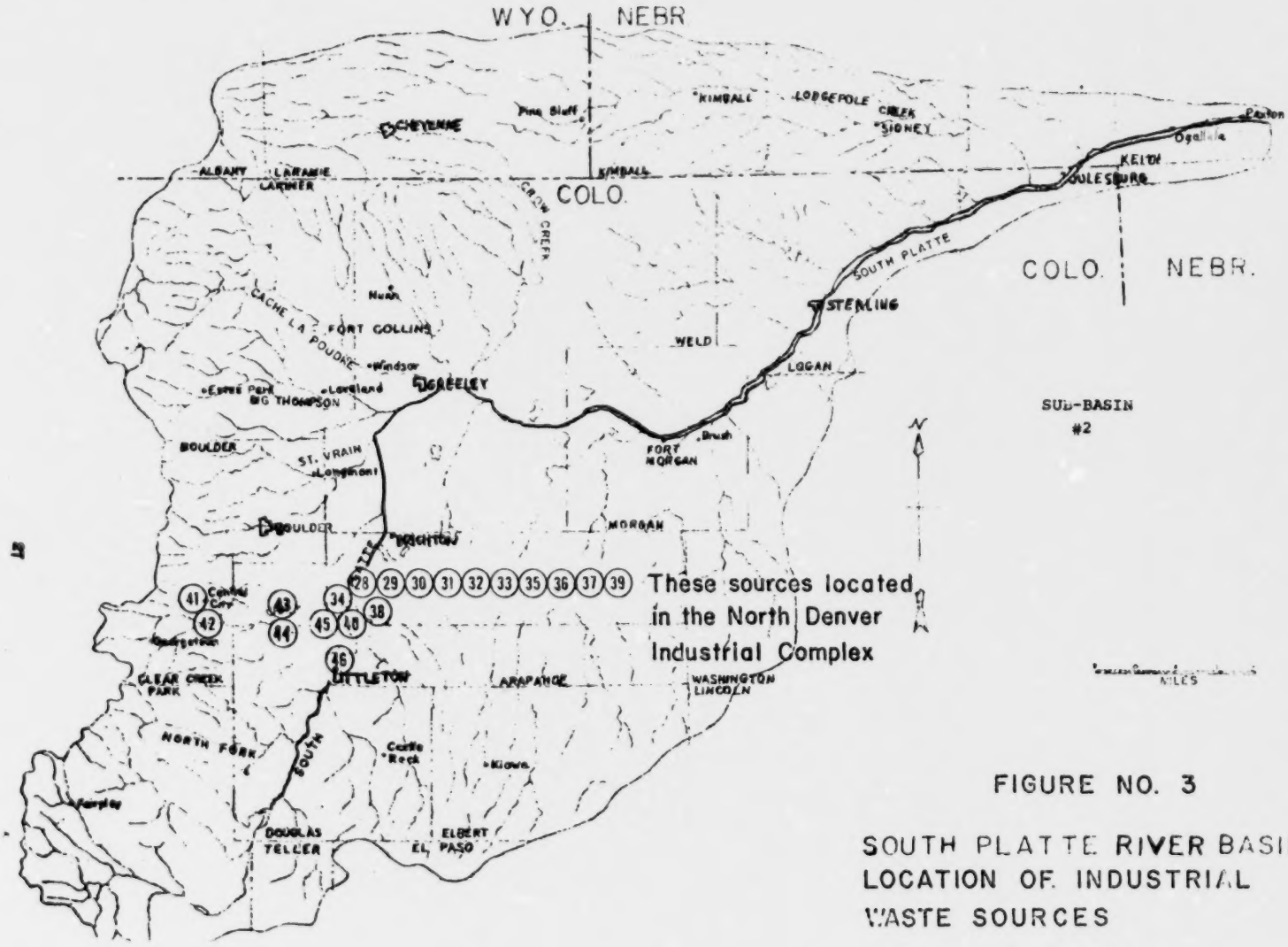

FIGURE NO. 3

SOUTH PLATTE RIVER BASIN
LOCATION OF INDUSTRIAL
WASTE SOURCES

TABLE NO. 3 - BASIC DATA ON SOURCES OF POLLUTION
SUB-BASIN No. 3 - BELOW THE NORTH DENVER INDUSTRIAL COMPLEX
TO BELOW THE CONFLUENCE OF THE CACHE LA POUDRE RIVER

Municipality or Industry	Map Ident. Number	Severed Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
Ault S. D.	1	900	900E	Municipal	Secondary (Imhoff tank + trickling filter)	Undet. 1/
Broomfield Heights Mutual Service Assoc.	2	5,600	5,600E	Municipal	Secondary	1,130E
Brighton, Colorado	3	9,000	13,500E	Municipal	Secondary	1,200E
Boulder, Colorado	4	46,000	55,000E	Municipal	Secondary	14,700E
Berthoud, Colorado	5	1,100	1,100E	Municipal	Secondary	530E
Eaton, Colorado	6	1,230	1,230E	Municipal	Septic tank and sand filter	950E
Estes Park, Colo. Bureau of Reclamation	7	200	200E	Domestic	Secondary	100E
Estes Park, Colo.	8	6,000E (Summer Pop.) 1,500E (Winter Pop.)	Undet. (Varies with season)	Municipal	Secondary in Summer 2/	Undet. (Varies with season)
Erie, S.D.	9	780	780E	Municipal	Lagoon	320E
Evans S. D.	10	2,200	2,200E	Municipal	Lagoon	580E
Dacona, Colo.	11	1,400	1,400E	Municipal	Lagoon	330E
Fredrick, Colo.	11	1,400	1,400E	Municipal	Lagoon	330E
Firestone, Colo.	11	1,400	1,400E	Municipal	Lagoon	330E
Evanston, Colo.	11	1,400	1,400E	Municipal	Lagoon	330E
Fort Lupton, Colo.	12	3,200 Avrg.	6,300E	Municipal	Primary	2,200E
Fort Collins, Colo.	13	25,027	30,000E	Municipal	Secondary	9,500E
Greeley, Colo.	14	26,000	60,000E	Municipal	Secondary	10,140E

1/ Effluent is used for irrigation during season - probably discharged to a watercourse during remainder of year.

2/ Freezing problems with trickling filter during the winter.

TABLE NO. 3 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P. E. Discharge to Watercourse
Hudson, S. D.	15	400	400	Municipal	Lagoon	0
Johnstown, Colo.	16	1,300	1,300E	Municipal	Lagoon	Undet.
Keensburg, Colo.	17	325	325E	Municipal	Lagoon	55E
Lyons, Colo.	18	1,200	1,200E	Municipal	Primary	780E
Loveland, Colorado	19	9,000	Undet.	Municipal	Secondary-Additional secondary treatment facilities completed.	Undet.
Louisville S.D.	20	2,400	2,400E	Municipal	Secondary	1,500E
Longmont, Colo.	21	12,000	12,000E	Municipal	Secondary	4,000E
LaSalle, Colo.	22	1,200	1,200E	Municipal	Septic Tank	780E
Lafayette, Colo.	23	3,000	3,000E	Municipal	Primary	2,100E
Milliken, Colo.	24	710	710E	Municipal	None	710E
North College Ave. S.D., Fort Collins	25	700	1,000E	Domestic	Secondary	125E
Platteville, Colo.	26	240	240E	Domestic	None	240E
Windsor, Colorado	28	1,500	1,500E	Municipal	Secondary	370E
Wellington, Colo.	29	550	550E	Municipal	Primary	385E
YMCA Conference Camp, Larimer County (near Estes Park)	30	100 to 1,300	100 to 1,300E	Domestic	Secondary	Undet. (Varies with camp pop.)
Barber Poultry, Broomfield	31	100 employees	Undet.	Poultry Processing	Septic tank for employees. Lagoons for Industrial wastes.	0
C-W Sugar Mill, Brighton (non-Steffens House)	32	277 employees Oct. 1-Jan.15	Undet.	Beet Sugar Mfgr.	Sanitary sewage to Brighton sewers Lagoon and lime pond for industrial wastes presently full, overflowing to McCann Ditch	186,000E

TABLE NO. 3 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
Kuner-Empson, Brighton	33	100 to 200 employees (varies with season and pack)	Undet.	Food Processing & packing. Strength and flow of wastes varies with season and pack	Sanitary sewage to Brighton sewers; cured pickle wash to Brighton. Other wastes screened and discharged to ditch	Variable (Seasonal)
Arapahoe Chemicals Inc., Boulder	34	45 employees	Undet.	Organic Chemicals	All wastes to Boulder sewers	None
Beech Aircraft Research and Development, Boulder	35	200 employees	Undet.	Missile R & D	Septic tank for employees Other wastes to lagoon.	0
Dow Chemical Co., Rocky Flats	36	Undet.	Undet.	3/	4/	140E
Allied Chemical and Dye Corp. General Chemical Div., Valmont Mill, Boulder	37	18 employees @ mill 37 employees @ mind	Undet.	Mining & milling of fluorspar ore	Septic tank for employees. Tailings pond for industrial waste for mill.	0
G-W Sugar Mill, Longmont (Steffens House)	38	300 employees Oct. 1 to Jan.15	Undet.	Beet Sugar Mfgr.	Sanitary and Industrial wastes discharged untreated; lime pond.	161,000E

3/ Sanitary waste plus some industrial wastes from top secret atomic production and/or research.

4/ Sanitary waste treated by activated sludge followed by chlorination. Treated sanitary waste discharged to three ponds in series which overflow to Walnut Creek. Industrial wastes which are toxic, radioactive, or otherwise objectionable are treated in the Process Waste Treatment Plant. Suitable effluent from PWTP discharged to the three ponds. Unsuitable effluent discharged to lined evaporation ponds.

TABLE NO. 3 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P. E. Discharge to Watercourse
Kuner-Empson, Longmont	39	10 to 125 employees (seasonal operation)	Undet.	Food Processing and Packing	Sanitary sewage to Longmont sewers; industrial waste discharged untreated.	2,600E
Longmont Packing Co., Longmont	40	4 employees	Undet.	Custom Slaughterhouse	Pit privy for employees. Septic tank for industrial waste.	0
Earl Sweeney and Co., Boulder County	41	Undet.	Undet.	Reclamation of Climax Molybdenum rejects	Tailings ponds	0
Canada Dry Bottling Co., Fort Collins	42	9 employees	Undet.	Soft drink Bottling	Cesspool for sanitary and industrial wastes	0
Cherry Products Co., Loveland	43	65 employees Jul.20-Aug.10	Undet.	Cherry Processing	Removal of pits before discharge	Presently closed no longer operating
Dreher Pickle Co., Fort Collins	44	17 employees	Undet.	Pickle Processing	Septic tank for employees. Discharges wastes to the Fort Collins sewers.	0
Graves Grade A Dairy, Bellevue	45	2 employees	Undet.	Milk and Cream Production	Septic tank for employees. Industrial wastes discharged untreated on dairy property.	Undet.

TABLE NO. 3 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
G-W Sugar Mill, Loveland (Steffens House)	46	300 employees Oct. 1- Jan. 15	Undet.	Beet Sugar Mfgr.	Sanitary sewage to Loveland sewers. Industrial wastes to lagoons	125,000E
Hewlett-Packard Co., Loveland	47	300 employees (to be increased to 500-600)	Undet.	Electronic Equipment Mfgr.	All wastes discharged to Loveland sewer	None
Ideal Cement Co., LaPorte	48	246 employees	Undet.	Cement Mfgr.	Septic tanks for employees. Industrial waste recycled from pond.	0
Loveland Packing Co., Loveland (To be connected to Loveland City Sewers soon.)	49	30-35 employees	Undet.	Custom Slaughter and Packing	Septic tank for employees. Inudstrial wastes to septic tank overflowing to discharging lagoon.	Undet.
Mineral Concentrates and Chemicals, Loveland	50	32 employees	Undet.	Beryllium Hydroxide Production	Sanitary sewage to Loveland sewer. Industrial wastes to settling pond.	0
Mineral Concentrates and Chemicals, Berthoud	51	5-6 employees	Undet.	Ceramic Production	Septic tank for employees. Land disposal for industrial wastes.	0
Neville Cider, Loveland	52	Undet. May 20-Nov.1	Undet.	Fruit Drinks Production	Septic tank for employees and industrial wastes.	0
Sullivan Dairy, Fort Collins	53	5 employees	Undet.	Dairy Product Production	Septic tank for employees. Industrial waste untreated.	Undet.

TABLE NO. 3 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P. E. Discharge to Watercourse
The Wolaver Co. near Loveland	54	43 employees Jul.15-Aug.6	Undet.	Cherry Processing	Septic tank for employees. Industrial waste untreated.	Closed, no longer operating
G-W Sugar Mill, Eaton	55	180 employees Oct.1-Jan.15	Undet.	Beet Sugar Mfgr.	Sanitary sewage to Eaton sewers. Industrial waste untreated except for lime pond.	260,000E
G-W Sugar Mill, Greeley	56	182 employees Oct.1-Jan.15	Undet.	Beet Sugar Mfgr.	Sanitary sewage to Greeley sewers some industrial wastes screened and discharged to lagoon. Others discharged untreated. Lime pond provided.	326,000E
Gettman Meat Packing Co.,Greeley	57	4-5 employees	Undet.	Custom Slaughter-house	Pit privy for employees. Industrial wastes discharged to a septic tank and to the Poudre River.	Undet.
Goldsmith's Jersey Dairy, Greeley	58	10-12 employees	Undet.	Dairy Products	Septic tank for employees. Land disposal for industrial waste.	None
Anderson Jersey Dairy, Fort Lupton	59	Undet.	Undet.	Dairy Products	Septic tank for employees. Lagoon for industrial waste.	None
Budd's Redi-Fry, Greeley	60	6-7 employees	Undet.	Blanched Potato Products	Septic tank for all wastes.	None

TABLE NO. 3 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P.E. Discharge to Watercourse
Ennes Dairy, Greeley	61	12-15 employees	Undet.	Dairy Products	Septic tank for employees. Industrial waste to natural lagoon.	None
Windsor Packing Co., Windsor	62	8-10 employees	Undet.	Meat Packing	Lagoon for sanitary and industrial wastes.	None
Quality Dairy, Evans	63	2 employees	Undet.	Dairy Products	Septic tank for sanitary and industrial wastes.	None
Reichert Packing Co., LaSalle	64	6 employees	Undet.	Slaughter-house	Septic tank for sanitary and industrial wastes.	None
R&W Packing Co., Pierce	65	3 employees	Undet.	Custom slaughter-house	Septic tank for sanitary and industrial wastes.	None
Greeley Locker & Meat Co., Greeley	66	8-10 employees	Undet.	Custom slaughter-house	Septic tank for employees. Industrial wastes to septic tank overflowing to a lagoon.	Undet.
Kuner-Empson Co., Greeley	67	5-175 employees	Undet.	Food Processing and Canning	Sanitary waste to Greeley sewers. Industrial waste screened and discharged to Greeley sewers.	Undet.
Lowell-Paul Dairy, Greeley	68	12 employees	Undet.	Dairy Products	Septic tank for employees. Industrial waste discharged to irrigation ditch.	Undet.
G-W Sugar Factory Johnstown	69	180 employees (all year)	Undet.	Beet Sugar Production (Barium process)	Sanitary waste to lagoon. Industrial wastes to lagoon (some untreated discharge).	82,700E

TABLE NO. 3 (Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P. E. Discharge to Watercourse
G-W MSG Plant, Johnatown	70	120 employees (all year)	Undet.	Monosodium Glutamate Production	All Wastes to lagoons.	Included in #69 above.
G-W Sugar Mill, Windsor	71	180 employees Oct.1-Jan.15	Undet.	Beet Sugar Production	All wastes to lagoons.	200,000E
Monfort Packing Co. Greeley	72	270 employees	Undet.	Slaughter-house	Sanitary waste to Greeley sewers. Industrial wastes to Greeley sewers or bypassed to Poudre River (some untreated discharge at all times).	82,000E

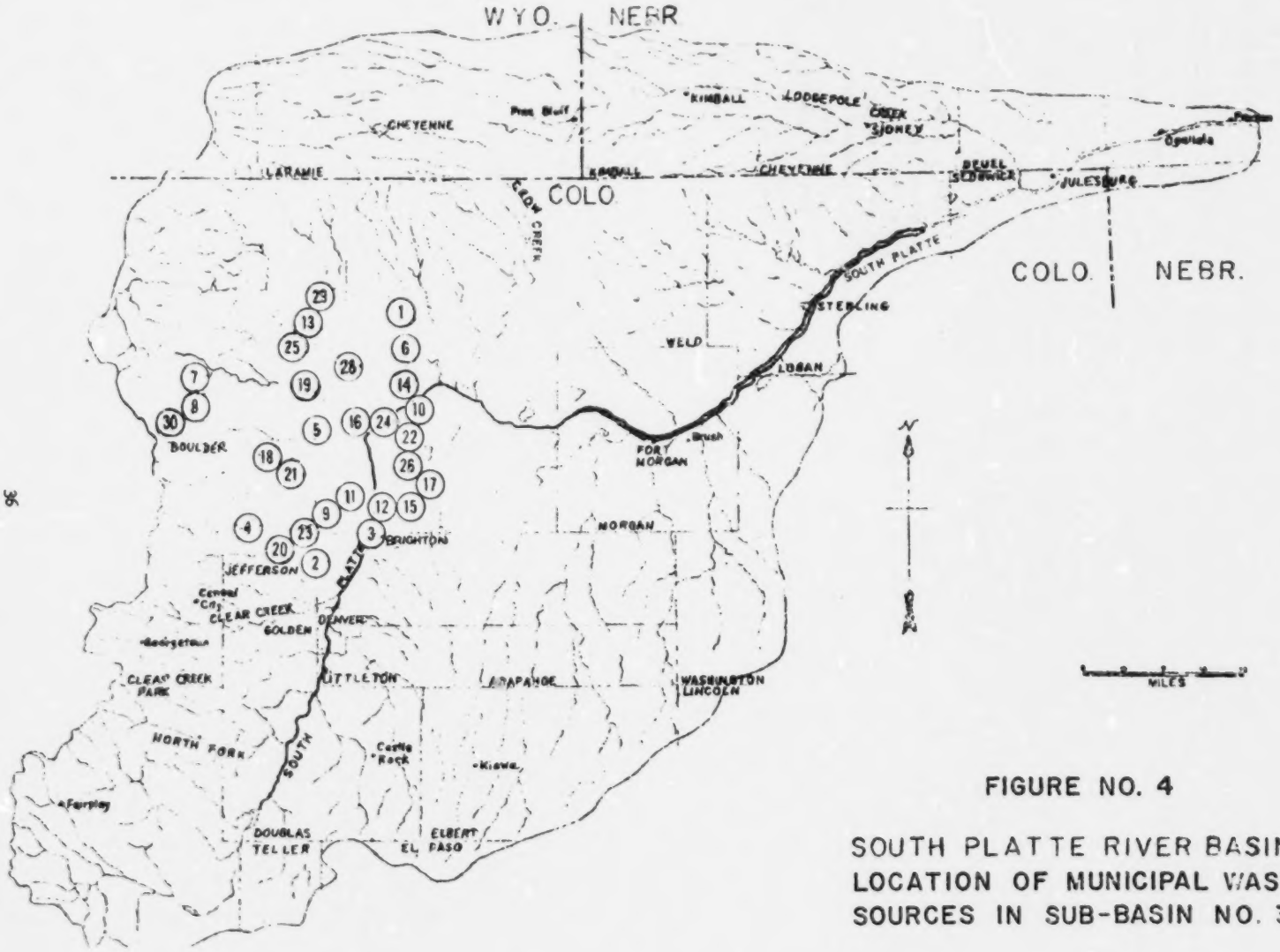

FIGURE NO. 4

SOUTH PLATTE RIVER BASIN
LOCATION OF MUNICIPAL WASTE
SOURCES IN SUB-BASIN NO. 3

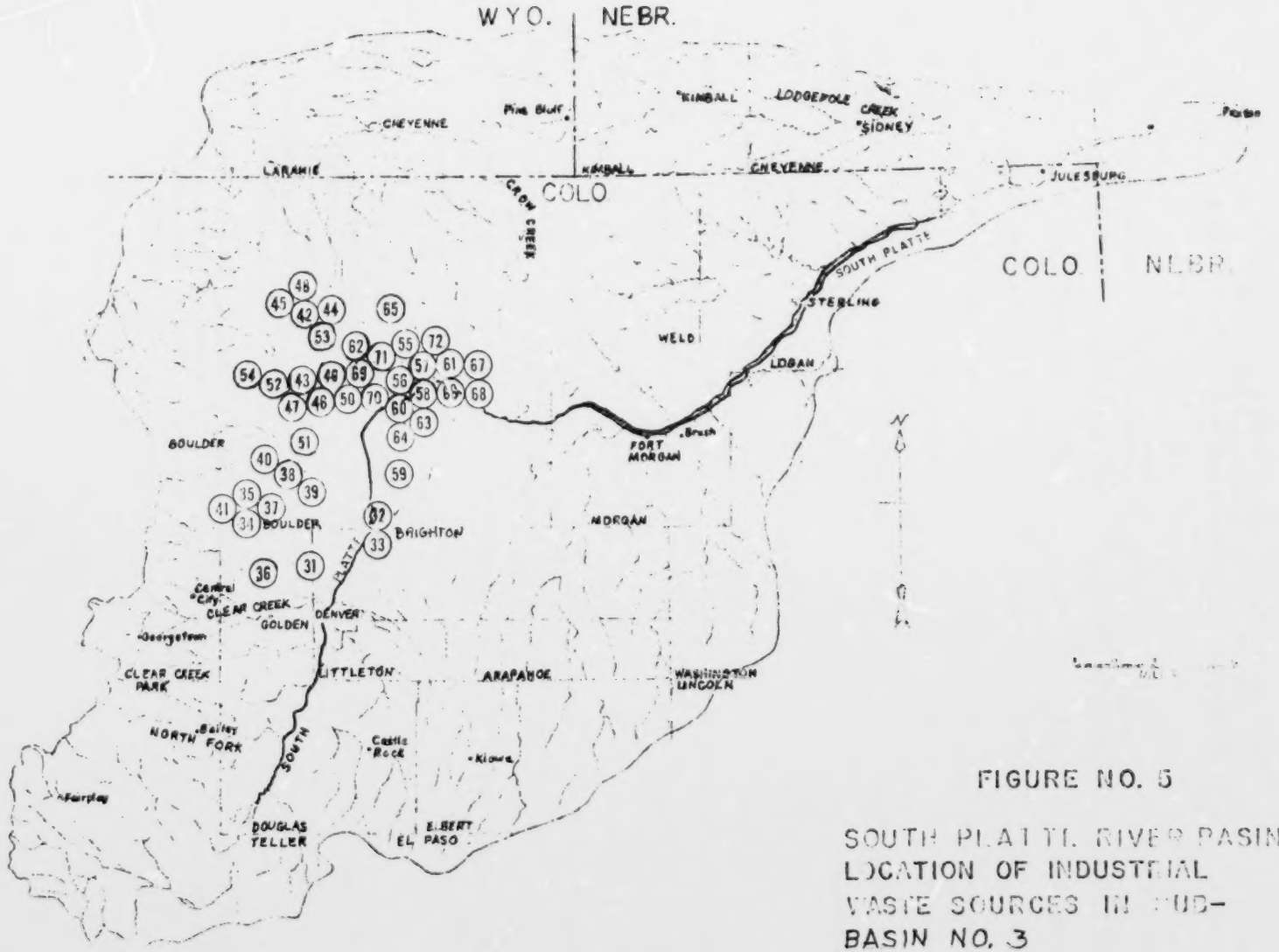

FIGURE NO. 5

SOUTH PLATTE RIVER BASIN
LOCATION OF INDUSTRIAL
WASTE SOURCES IN SUB-
BASIN NO. 3

TABLE NO. 4 - BASIC DATA ON SOURCES OF POLLUTION
SUB-BASIN NO. 4 - BELOW THE CONFLUENCE OF THE
CACHE LA POUDRE RIVER TO THE COLORADO-NEBRASKA STATE LINE

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P. E. Discharge to Watercourse
Byers, S.D.	1	500	500E	Municipal	Evap. Lagoon	0
Bennett, S.D.	2	525	525E	Municipal	Evap. Lagoon	0
Brush, Colorado	3	3,621	3,621E	Municipal	Seconday	320E
Crook, S.D.	4	225	225E	Municipal	Primary	140E
Deer Trail, Colo.	5	500E	500E	Municipal	None	500E
Fort Morgan, Colo.	6	8,000	8,000E	Municipal	Secondary	5,600E
Julesburg, Colo.	7	1,750	1,750E	Municipal	Secondary	350E
Kersey, Colorado	8	350	350E	Municipal	Evap. Lagoon	0
LogLane Village, Colo.	9	310	310E	Municipal	Lagoon	160E
Merino, Colorado	10	250	250E	Municipal	Lagoon	Undet.
Ovid, Colorado	11	600	600E	Municipal	None	600E
Strasburg, S.D.	12	680	680E	Municipal	Evap. Lagoon	0
Sterling, Colo.	13	11,000	11,000E	Municipal	Secondary	2,800E
Brush Packing Co., Brush	14	2 employees	Undet.	Custom Slaughter-house	Septic tank for sanitary and industrial wastes.	None
G-W Sugar Mill, Fort Morgan	15	309 employees Oct.1-Jan.15	Undet.	Beet Sugar Production	Sanitary sewage to Fort Morgan sewers. Industrial wastes to lagoons.	130,000E
Morgan Locker, Fort Morgan	16	4 employees	Undet.	Slaughter-house	Septic tank for sanitary and industrial wastes.	None

TABLE NO. 4(Cont'd)

Municipality or Industry	Map Ident. Number	Sewered Population	P.E. Waste Before Treatment	Nature of Waste	Treatment Provided	P. E. Discharge to Watercourse
Wiggins Frozen Food Lockers, Wiggins	17	Undet.	Undet.	Slaughter-house	Septic tank for industrial wastes.	None
G-W Sugar Mill, Sterling (non-Steffens House)	18	175 employees Oct.1-Jan.15	Undet.	Beet Sugar Production	Sanitary and industrial wastes discharged untreated. (Some screening of industrial waste.)	217,000E
Quality Packing Co., Sterling	19	8 employees	Undet.	Custom Slaughterhouse	Septic tank for sanitary and industrial wastes.	None
Sterling Packing Co., Sterling	20	10 employees	Undet.	Custom Slaughterhouse	Septic tank for employees. Lagoon for industrial waste.	0
G-W Sugar Mill, Ovid	21	224 employees	Undet.	Beet Sugar Production	Sanitary and industrial wastes discharged untreated except for a lime pond.	110,000E
Ovid Locker, Ovid	22	4 employees	Undet.	Custom Slaughterhouse	Septic tank for sanitary and industrial wastes.	None

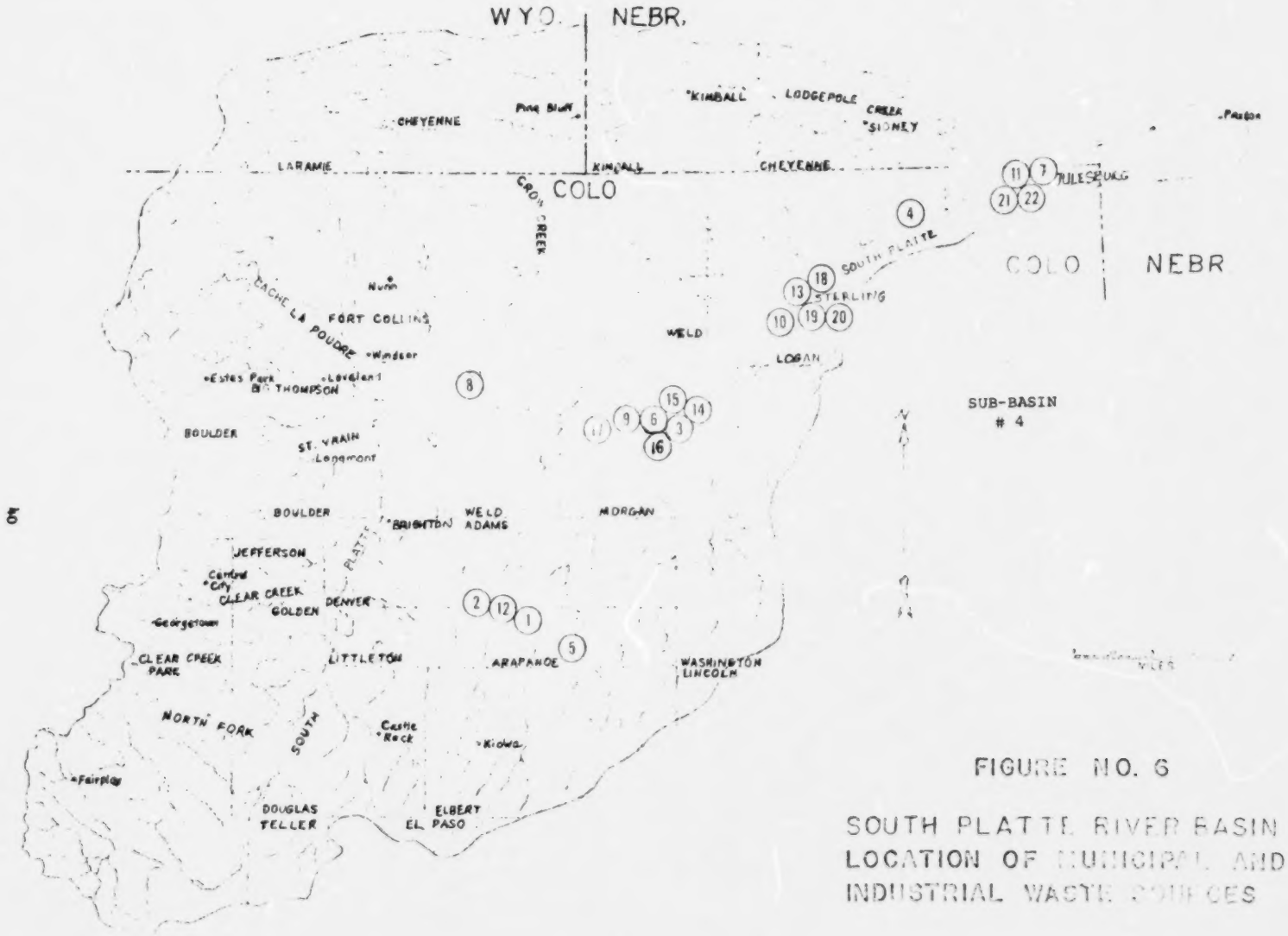

FIGURE NO. 6

SOUTH PLATTE RIVER BASIN
LOCATION OF MUNICIPAL AND
INDUSTRIAL WASTE SOURCES

MR. CLARK: It is important to note that from 1950 to 1960 residual wastes discharged to Basin streams have increased 90 percent, from 480,000 to 910,000.

Industry contributes a significant part of the total pollutional load to the Basin. Eleven sugar beet factories in Colorado, over the season of October 1961 through January 1962 contributed an estimated daily population equivalent of 1,800,000 (based on organic biochemical oxygen demand load) to the South Platte River and its tributaries. The wastes discharged from the sugar beet factories in 1948-1950 were equal to a daily population equivalent of 4,100,000 and there has been considerable reduction in pollutional loading. However, more treatment of wastes and better housekeeping must be undertaken by the sugar beet mills and factories to reduce organic wastes before water quality of many stretches of the Basin streams is improved.

Manufacturing plants connected to municipal sewerage systems in 1960 contributed raw wastes having a population equivalent of 450,000. This is reduced by treatment to 250,000 population equivalents in the wastes discharged to Basin streams. The degree of purification provided domestic and industrial wastes within municipal treatment plants is inadequate to maintain satisfactory stream conditions and guarantee adequate water quality in many areas. The large growth in population and industrial activity has greatly increased the problems and complexities of sewage and industrial waste disposal. Completion by 1966 of secondary treatment facilities by the Denver Metropolitan Sewage District No. 1 should improve the quality of the South Platte River waters below the Denver area.

A considerable number of industrial plants are not tied into municipal sewerage systems. Some of these industries, including several packing houses and food canneries, need to provide additional waste handling and treatment facilities. This would improve downstream water quality and eliminate some local nuisance conditions.

The water quality of streamflows in the Basin is adversely affected not only by organic (biochemical oxygen demand) pollution, but also by gross inorganic chemical discharges arising from irrigation and industry; by trace amounts of toxic heavy metals from ore mining and processing, and natural runoff; by bacteriological pollution from inadequately treated municipal sewage, certain industrial wastes and from feed lot operation; and by persistent organics from pesticide spraying of agricultural crop lands, and from petroleum and chemical refineries.

A problem of great significance in the South Platte River Basin involves the effects of inadequately treated municipal wastes and certain industrial wastes on Basin waters. High densities of coliform organisms contained in the main stem river water downstream from Denver to Kersey, and also evident in tributary waters extending downstream from other centers of population, may be a serious public health problem since surface streamflows are largely diverted for irrigation use below many of these sources of bacterial contamination. The diverted waters, containing a large portion of inadequately treated sewage effluent, are applied to the land for irrigation of field crops and of truck-farm crops. The latter crops are most important from the public health standpoint since these vegetables and fruits are directly consumed by the human population and some are eaten raw.

This problem of bacteriological contamination is most critical in the farming area downstream and north of Denver. Further study is urgently needed in this regard.

Feed lot operations are also a source of pollution in terms of bacterial and organic loadings to Basin streams, but insufficient information is available to indicate the magnitude of this problem.

Bacteriological contamination of Basin streams and waterways poses a health hazard in the use of these waters for such recreational pursuits as fishing, swimming and boating. Fishing and hunting take place in and adjacent to the polluted streams and there is swimming in local areas.

Pollution of many Basin waters can be materially reduced by improved treatment facilities for municipal waste effluents, and by providing adequate chlorination for these discharges.

Water quality of surface flows is affected in other ways by extensive use of these waters for irrigation of agricultural crops. Irrigation greatly reduces the available water supply of the Basin by evapotranspiration losses. Irrigation may contribute a significant load of salts in return flows. Increase in gross inorganic chemical concentration in surface flows may also be detrimental to quality of certain ground water supplies within the alluvium deposits of flood plains of the middle and lower mainstem of the river and its tributaries.

Trace inorganics, including the heavy metals group, and iron and manganese, can be dissolved in sufficient amounts in surface flows to warrant attention. These materials may stem from abandoned or active ore mining and processing operations found in the upper and middle portions of certain tributary streams, or from natural origin. Heavy metals even in extremely low concentrations can be harmful to humans, fish life, and stream bottom fauna.

Persistent organic waste materials are contributed in the form of pesticides to Basin waters from farmland and from other sources. The concentration of these contaminants in water should be reduced to a minimum level. A surveillance program encompassing sampling and chemical analyses of Basin waters is necessary to meet this objective.

Many highly objectionable waste components can be discharged to watercourses by petroleum and other chemical refineries and may create another seious problem. Some of these materials are highly resistant to degradation, and even in extremely minute concentrations warrant consideration owing to the taste, odor and other problems that they may create. The area downstream from Denver requires detailed investigation of the above pollutants.

Specific conditions which strongly indicate the need for further study and corrective action are given in the following.

The lowest dissolved oxygen conditions and highest biochemical oxygen demand values in the Basin, exclusive of those effects attributable to sugar beet processing wastes, are evident in the South Platte River downstream from Denver to the Kersey area, and on the Cache la Poudre River below the cities of Windsor and Greeley. Below Denver, the average dissolved oxygen in the summer seasons of 1948-1950 ranged from 3.5 to 8.0 milligrams per liter (mg/l); average biochemical oxygen demand ranged from 5 to 35 milligrams per liter. Individual values in many cases, however, showed the presence of considerably higher organic levels for short periods of time. Conditions below Windsor and Greeley were less severe. A minimum dissolved oxygen of 5 milligrams per liter is generally considered necessary for the propagation and growth of various species of trout.

Sugar beet operations contribute large organic waste loads from October through January. Most serious stream conditions in the winter season, as evident from dissolved oxygen and biochemical oxygen demand results of 1948-1950, are present in the mainstream South Platte River from Denver to Kersey, and the area below Sterling; on the Cache la Poudre River below both Windsor and Greeley; on St. Vrain Creek below Longmont; on Boulder Creek below the City of Boulder; on the Thompson River below

Loveland; and on Clear Creek below Golden, Colorado. Dissolved oxygen and biochemical oxygen demand levels in the South Platte River below Denver in the winter period approximate the pollutional picture during summer.

Average dissolved oxygen below Windsor and Greeley on the Cache la Poudre River decrease to about 6.0 milligrams per liter and biochemical oxygen demand levels range from 20 to 50 milligrams per liter. Conditions on St. Vrain Creek below longmont indicate a decrease in average dissolved oxygen to 3.5 milligrams per liter and stream biochemical oxygen demand concentrations in excess of 250 milligrams per liter. Downstream from Loveland on the Big Thompson River, the addition of sugar beet wastes increases stream biochemical oxygen demand values to 70 milligrams per liter. These are averages, and individual field results show even more severe stream conditions occur at times.

Pollution, as measured by the coliform index, is widespread througout the South Platte River Basin. Conditions are aggravated by the minimal quantities of streamflow available for dilution of municipal and industrial waste loads. Since agriculture, one of the keystones of the regional economy, depends upon the availability of large quantities of water of suitable quality for irrigation purposes, serious loss in crop sales could result from use of contaminated water for irrigation of crops. Many major agricultural areas in the Basin divert sewage-laden waters for irrigation directly below sources of inadequately treated municipal wastes. A large number of diversions contain median coliform densities in excess of 100,000 organisms per 100 milliliters, and a few contain median coliform densities in excess of 1,000,000 organisms per 100 milliliters.

The Barr Lake situation highlights the serious bacteriological contamination of irrigation waters throughout the Basin. Located approximately 15 miles northeast of Denver, Barr Lake is a relatively large storage reservoir (1,790 acres and 28,500 acre-feet) which provides irrigation water to an extensive area between Denver and Brighton. Streamflow is diverted from the South Platte River into the Burlington-O'Brien Canal, which is about 100 yards downstream from the waste discharge outlet of the Denver North Side Sewage Treatment Plant. One branch of the Burlington-O'Brien Canal, after flowing 14 miles, delivers water to Barr Lake. The general public considers the offensive odors emanating from Barr Lake as the greatest problem at present. However, the fecal coliforms, with the possibility at any time of pathogenic organisms contained in the canal waters and applied to crops grown for human consumption, may in addition constitute a serious threat to human health.

Data collected from the 1948-1950 Public Health Service investigations and from the Colorado State Department of Public Health studies of 1956 on Barr Lake, indicate that Denver sewage treatment plant effluent comprises 58 percent of the total streamflow below Denver during the summer period, and 73 percent of streamflow during the winter period, based on mean low monthly streamflows. This effluent creates extremely high coliform counts, little or no dissolved oxygen and very high biochemical oxygen demand levels in the Burlington-O'Brien Canal waters, the upper part of Barr Lake and other nearby streams. Extensive sludge deposits were also evident throughout the water-carriage system.

As early as 1949, it was found that the median coliform density for 26 samples collected from the Burlington-O'Brien Canal intake was 59,000 organisms per 100 milliliters. The range in values was from 7,500 to 11,000,000 organisms per 100 milliliters. Similar data collected for Gardner's Ditch Intake, located 0.6 miles downstream of the Burlington-O'Brien Intake, showed a median coliform level of 190,000 and a range of 2,300 to 2,400,000 organisms per 100 milliliters in the irrigation supply. The Fulton Ditch Supply and Brantner Ditch Intake, located respectively 4.0 and 6.2 miles further downstream on the South Platte, contained respective median coliform counts of 93,000 and 310,000 organisms per 100 milliliters.

Additional studies in 1950 in the area immediately below Denver show strong evidence that (1) the waters used for irrigating vegetable crops contain extremely high coliform densities; (2) leafy vegetables such as lettuce, cabbage, and celery show high coliform densities; and (3) a large number of Salmonella organisms have been reported in samples of sewage, river water, and irrigation water.

Information collected by the Colorado State Department of Public Health and the Health Department of the City and County of Denver (1961-1963) verify the above findings in respect to coliform organisms. Additional studies in published literature by Dr. Dunlop and associates of the Colorado School of Medicine over the period 1940 to the present, verify the presence of large numbers of Salmonella organisms in the Denver North Side Sewage Treatment Plant Effluent, river water, and diverted irrigation water below Denver.

A recent study was completed by the United State Geological Survey of quality of ground and surface waters in the South Platte River Basin from Denver to Fort Lupton, Colorado. These investigations were conducted from July 1961 to February 1963 on a reimbursable basis for the Federal Housing Administration. A major objective of this study was to determine the levels and inter-relationships of ABS pollution in ground and surface waters below Denver.

MR. STEIN: Mr. Clark, some of the people may not know what ABS is. Would you explain it, please?

MR. CLARK: ABS is one of the major components in detergents that makes them foam up nicely, and its chemical name is alkyl benzene sulfonate.

MR. STEIN: Thank you, Mr. Clark.

MR. CLARK: Other important data were collected on total and coliform bacteria, dissolved solids, dissolved oxygen and biochemical oxygen demand. Preliminary results show that within one mile of the discharge of the Denver North Side Treatment Plant average ABS increases from 0.7 to 1.8 milligrams per liter; bacterial increases from 12 million to 37.5 million per 100 milliliters; coliform bacteria increases from 100,000 to 2.5 million per 100 milliliters; biochemical oxygen demand rises from 6 to 90 milligrams per liter; dissolved oxygen decreased from 7 to 3.5 milligrams per liter, and dissolved solids increases from 430 to 550 milligrams per liter.

This information confirms the findings of previous water quality investigations. The report providing the complete results of the United States Geological Survey - Federal Housing Administration study is in the process of review and so far as I know is not available now for release. Dr. Wayman of the United States Geological Survey, in charge of this special study, has been invited to present his findings in this study.

Since the summer of 1962, concentrations of nitrate nitrogen (as NO_3) in the municipal water supply of Brighton, Colorado, have exceeded the upper limit of 45 milligrams per liter prescribed by the 1962 United States Public Health Service Drinking Water Standards. Nitrate content of this water was found to range from 45 to 60 milligrams per liter. This supply is derived from a network of shallow wells. Excessive nitrate content is associated with the increased incidence of methemoglobinemia in children up to the age of six months. At least one case of illness in infants has been attributed by the Tri-County Health Department to high nitrates in the municipal water supply.

The Northwest Water Corporation, South Adams Water and Sanitation District, and Northwest Utilities District take water from gravel pack wells adjacent to the confluence

of Clear Creek and the South Platte River where evidence of pollution exists. These wells receive water from these streams by infiltration. The potential contamination of these well water supplies requires further study. The City of Westminster and the Baker Water and Sanitation District also located in this area utilize Clear Creek water to supplement ground water supply. During late summer to early winter, pollution conditions in Clear Creek are critical because of low streamflow. The presence of inadequately treated sewage and persistent detergents -- that is, ABS as well as others -- in Clear Creek waters at the point of withdrawal have in the past led to serious complaints by the water users.

Some long-term chemical water quality data is available for waters of the South Platte Basin. The United States Geological Survey has maintained 24 water quality sampling stations on the South Platte River and tributaries. However, except for four stations, this data is non-continuous or represents a record period of only a few months. Six grab samples taken in Water Years 1957 and 1958 of the South Platte River at Waterton, Colorado (above Denver), indicate a range in total dissolved solids content of 55-178 milligrams per liter. Composite sample values taken in Water Years 1956 and 1957 for the South Platte River at Henderson, Colorado (below Denver), show an average total dissolved solids concentration of 350 milligrams per liter and a range in values of 147-874 milligrams per liter.

A United States Public Health Service National Water Quality Network station was established in April 1961 at Julesburg, Colorado. During the period June 1962 to February 1963, results for the Network station show a range in average monthly chemical results as follows: Total dissolved solids - 1,370 to 1,600 milligrams per liter; sulfates - 670 to 750 milligrams per liter; hardness - 630 to 740 milligrams per liter. Chloroform extractable organic materials found in September 1961 to October 1962 are present in concentrations of 16 to 50 parts per billion and alcohol extractables range from 90 to 230 parts per billion. Dissolved oxygen values over the period November 1961 to February 1962 vary from 3.7 to 14.2 milligrams per liter; biochemical oxygen demand measurements range from 0.9 to 8.1 milligrams per liter.

SUMMARY AND CONCLUSIONS

On July 18, 1963, the Honorable John A. Love, Governor of Colorado, requested Secretary Celebrezze of the Department of Health, Education, and Welfare to assist in abating pollution of the South Platte River Basin under Section 8 of the Federal Water Pollution Control Act. In this letter, the Governor stated that serious pollution problems existed in Adams County and other portions of the Basin and that water quality information was needed to plan for demands relating to human consumption, irrigation, food processing, stock raising, recreation, and other important uses.

The South Platte River Basin presents a picture of severe pollution and serious degradation of water quality throuout much of its area.

The data collected from many sources provide evidence of continuing and increasing pollution. The problems of maintaining adequate water resources have been made extremely complex by the rapidly expanding population and industry. The need for providing highly efficient treatment plants for Basin-wide municipal and industrial wastes is urgent. Recently the people of Brighton, Colorado, protested against the offensive odors from Barr Lake, used as a storage reservoir for irrigation waters diverted from the South Platte River directly below Denver.

Water use in the South Platte River Basin area has been highly developed owing to an extensive irrigated agriculture and rapidly expanding population and industrial growth. Since total water demand is greater than the available supply, this indicates the important need for adequate treatment of wastes to permit optimum reuse of these waters.

Waste discharges from municipalities contribute a large and increasing portion of the total Basin pollutional load. At the present time, the total municipal load contains approximately 1,610,000 population equivalents on a biochemical oxygen demand basis, which is reduced by treatment to 910,000 population equivalents before discharge. The residual after treatment is now 90 percent greater than it was in 1950. Population equivalent refers to the biochemical oxygen demand of an average person in a typical population group. This is generally taken as 167 pounds of five-day biochemical oxygen demand per 1,000 population per day. Sugar beet wastes released during the season of October throughJanuary contain approximately 1,800,000 population equivalents of biochemical oxygen demand. The majority of industrial wastes, exclusive of the sugar beet industry are accepted by municipal sewerage systems and receive some degree of treatment. A number of industries which discharge their wastes separately need improved waste treatment measures.

The main water problems of the Basin are: (1) bacterial contamination of surface streamflow and irrigation supply waters; (2) high levels of readily decomposable organic loading in certain stream stretches reflected in large increase in biochemical oxygen demand concentration and dissolved oxygen depletion; (3) significant build-up of major inorganic chemical values where streamflow is diverted for irrigation use; (4) protection of ground water from pollution; (5) acquisition of data on the prevalence of persistent organic residues and other exotic materials, and dissolved trace inorganics, including heavy metals, in streamflow. A sound plan providing remedial measures for alleviating objectionable odor conditions in the Barr Lake area must also be developed at the earliest possible time.

Bacteriological pollution of Basin streams is a matter of utmost concern. Water containing inadequately treated municipal sewage is often used for irrigating vegetable and fruit crop lands. This may be a health hazard and should be carefully evaluated.

Limited investigations undertaken in 1948-1950 indicate that many diversions for irrigation below points of municipal waste discharge contained median coliform counts in excess of 100,000 organisms per 100 milliliter; a few samples were found to contain median coliform densities in excess of 1,000,000 organisms per 100 milliliter. These studies in the area immediately below Denver also indicated high coliform densities on leafy vegetables irrigated with polluted waters, and the presence of Salmonella organisms in these irrigation waters.

Information provided by the Colorado State Department of Public Health and the Health Department of the City and County of Denver (1961-1963) verify the above coliform data. Also, studies conducted by Dr. Dunlop of the Colorado School of Medicine over the period 1940 to the present verify the presence of large numbers of Salmonella organisms in the Denver North Side Sewage Treatment Plant effluent, river water, and diverted irrigation waters below Denver.

Detailed investigation of quality of ground and surface waters in the South Platte Basin from Denver to Fort Lupton, Colorado, was undertaken from July 1961 to February 1963 by the United States Geological Survey on a reimbursable basis with the Federal Housing Administration. Data were obtained at selected stations on concentrations of alkyl benzene sulfonate (ABS), total and coliform bacteria, total dissolved solids, dissolved oxygen and biochemical oxygen demand. This information confirms the results of earlier water quality studies. Large increases in the concentration of various constituents, except for a decrease in dissolved oxygen content, were evident in the South Platte River waters immediately below the Denver North Side Treatment Plant.

Concentrations of nitrate nitrogen (as NO_3) in the Brighton, Colorado, municipal water supply exceed the upper limit of 45 milligrams per liter prescribed by the

1962 "United States Public Health Service Drinking Water Standards." At least one case of illness in infants has been attributed by the Tri-County Health Department to excessive nitrates in this water supply which is derived from a shallow network of wells.

The Northwest Water Corporation, South Adams Water and Sanitation District, and Northwest Utilities District take water from gravel pack wells adjacent to the confluence of Clear Creek and the South Platte River where pollution is evident. These wells receive water from these streams by infiltration. The possibility of contamination of these well water supplies requires further study. The City of Westminster and the Baker Water and Sanitation District utilize Clear Creek water to supplement ground water supply. The presence of inadequately treated sewage and persistent detergents in Clear Creek waters at the point of withdrawal have led to serious complaints by the water users.

The summary information presented above clearly shows: (1) pollution of these waters endangers the health or welfare of persons in Colorado, (2) the urgent need to meet the challenge of ever increasing pollution; and, (3) the great number of new and complex water quality problems in the South Platte River Basin. Unfortunately, the situation has developed to the point where a water quality program for the South Platte must, in large part, require corrective action rather than preventive measures. A more detailed report has already been presented.

PROPOSED INVESTIGATIONS

To meet Governor Love's request, it is suggested that the Public Health Service:

1. Determine the legitimate water uses and locate the sources of pollution having an adverse effect on those uses.

2. Through field investigations determine the physical, chemical, and biological responses of the River to pollution, and evaluate the previously located sources of pollution with respect to the conditions in the river.

3. Compute the waste load reductions necessary to obtain desired water quality and recommend the water quality control measures needed to effect the desired waste load reductions.

That is my report, Mr. Chairman.

(Applause.)

MR. STEIN: Thank you. Are there any questions or comments?

Dr. Cleere from the Colorado Department of Health?

DR. CLEERE: Not at this time. Thank you.

MR. STEIN: I would like to thank you, Mr. Clark, and your colleagues, for a very excellent analysis. I am pleased to say that is about as good an analysis of a water pollution problem as I have seen. Sometimes we lawyers will say, "I think you have a real detailed bill of particulars."

Without attempting to prejudge, and we will hear from others later on, I don't think there is any doubt about what Mr. Clark and his colleagues found to be in the Colorado Basin. They have spelled out the problems with particularity and, as he indicates, the South Platte River Basin, if I can possibly summarize interimly, in this

situation presents a clear picture of severe pollution and serious degradation of water quality througout much of this area. In many cases the trend is towards the intensification and the worsening of this situation rather than abatement. I think that it points out that possibly almost heroic measures may be needed if we are to reverse this trend.

I think at the present time we might recess for ten minutes before we go on with the rest of the conference.

Thank you.

(Whereupon a recess was had.)

MR. STEIN: May we reconvene?

I am going to take this opportunity to start, because things are progressing so famously, and the way the agenda looks I do think with a little luck we may be able to finish about twelve-thirty and have the conference completed. At twelve o'clock we will be able to tell more definitely.

However, this is not said to put any inhibition on anyone to develop his points absolutely fully, because we are here at your disposal, but this is why we started so promptly.

At this point, I would like to call on Mr. Klashman again.

Mr. Klashman.

MR. KLASHMAN: Before calling on the other Federal agencies for statements, I should like to introduce three other colleagues.

Mr. Kaarlo Nasi, Assoicate Health Director for the Public Health Service of Region 8.

Mr. Herb Clare, Regional Program Director for Water Supply and Pollution Control -- my counterpart in Region 6, Kansas City.

Mr. Peter Kuh, the Assistant Chief of our Enforcement Branch.

Thank you.

Mr. Knights of the Bureau of Reclamation, I understand you have a statement.

Do you have a copy of your statement for the reporter?

MR. KNIGHTS: Yes.

STATEMENT OF

JAMES H. KNIGHTS, BUREAU OF RECLAMATION, REGION No. 7

DENVER, COLORADO

MR. KNIGHTS: Mr. Chairman and ladies and gentlemen:

I am Jim Knights, with the Bureau of Reclamation, Region 7, in Denver. I also represent today Mr. Harrel F. Mosbaugh, Interior Department Coordinator of the Missouri River Basin, with headquarters in Billings, Montana. This statement, however, is a Bureau of Reclamation statement. Mr. Mosbaugh had no particular statement to be presented.

The South Platte River Basin in Colorado contains 19,500 square miles and has approximately 1,126,000 inhabitants, as Mr. Clark told you.

The Bureau of Reclamation has been active in the South Platte Basin for many years. Our major accomplishment in the basin is the large and highly successful Colorado-Big Thompson Project, constructed between 1938 and 1954. In years past we have made studies of other projects and completed a basin-inventory-type report.

A potential Blue-South Platte Project was studied which would have diverted Blue River water for municipal and agricultural use in the Denver area. This plan never developed beyond the report stage, and since then the City of Denver has largely claimed and developed the waters considered in the Federal plan.

The Narrows Definite Plan Report completed in 1951 proposed main channel storage on the South Platte River in the vicinity of Ft. Morgan, to provide supplemental irrigation water and flood control. This development did not move forward at that time because of local opposition. Because of renewed interest in 1960 and 1961, we were asked by the Colorado Water Conservation Board to reconsider the Narrows Unit. We started work with State funds and obtained additional Reclamation funds for this work. A selection between the Narrows site seven miles above Ft. Morgan and the Weld County site 24 miles farther upstream near Kersey is still required. We are, however, going ahead with required agricultural economic studies and preliminary hydrology studies for a feasibility report.

In 1944 the Missouri River Basin Project was approved and the initial stage authorized. This project was designed to develop the water resources of the entire Missouri River Basin. The South Platte River Valley makes up about 4-½ percent of the Missouri River Basin Project area and contains 20 percent of the people living in the project area. This project is divided into many units, some constructed, some under construction, and many under study. The Bureau of Reclamation has spent three-quarter billion dollars in constructing units of that project. The Narrows development is a unit of the Missouri River Basin Project. Therefore, project planning funds have been made available for Narrows and such funds can probably be obtained for planning future units.

We are also presently using these funds to study the Cache la Poudre Unit, which proposes the construction of features to effect water savings to utilize fully the remaining undeveloped water in that tributary. We recently completed a reconnaissance report of this unit. The plan would provide water for agricultural and municipal purposes with minimum provision for the future inclusion of power. The plan contemplates development in two stages: The first stage can provide most of the

water and we are presently going ahead with the feasibility study on stage 1. The second stage would provide hydroelectric power and must await development of a market for peaking power before it can proceed.

Perhaps the most useful report completed by us is the South Platte River Basin Report. It covers the basin comprehensively, showing how all tributary and mainstem water supplies can be developed. For this purpose every potential development that could be conceived by the people doing the work at that time was considered and all those having a remote chance of feasibility are shown in the report. Those working with water developments in the basin will find it contains good reference material.

In July of this year we commenced another study of water development in that part of the basin above the confluence of the South Platte and Cache la Poudre River with money furnished by the Colorado Water Conservation Board. This money was provided by the State, municipalities, and ditch companies. It enables us to get started on a study of this area one year earlier than originally planned. We have Missouri River Basin Project planning funds scheduled for continuing the study next year. We are calling this unit the Upper South Platte Unit.

Our study will contain an inventory of potential water developments on all of the larger tributaries in this area and firmer data on the mainstem developments. The major feature on the mainstem would be the Two Forks Reservoir in the South Platte Canyon above Waterton, with a concrete arch dam approximately 500 feet high. The study must establish firm data on the location of the dam and possibly an afterbay below the dam, so that construction presently being planned by Aurora and Denver can be designed to complement the best Two Forks plan rather than conflict with it. The mainstem part of the study must provide for serving municipal and industrial needs, routing water through Denver, and utilizing municipal return flows and sewerage effluents for agriculture. For this latter purpose, storage below the Denver metropolitan area will be needed. We are presently considering off-stream storage at several sites.

The study of the Upper South Platte Basin Unit is just getting underway. We are starting an estimate of Two Forks Dam, have a scheme for flood control of Bear Creek, Turkey Creek and Clear Creek, and are studying a possible storage site east of Barr Lake. We need the cooperation and help of other Government agencies and all water user organizations in the area, particularly in determining their needs and future plans.

In all of our studies we consider the multiple purposes which may be beneficial. These include municipal and industrial water, irrigation, flood control, pollution abatement and sanitary control, power, fish and wildlife and recreation. It is, of course, our policy to cooperate with other Federal agencies having specific assignments in the fields relative to these purposes. Pollution abatement and sanitary control are particularly important in the large Denver metropolitan area. We look forward to cooperating with the Department of Health, Education, and Welfare and concerned State agencies in developing our plans in the South Platte River Basin.

Thank you, Mr. Chairman.

(Applause.)

MR. STEIN: Thank you.

Are there any comments or questions?

(No response.)

MR. STEIN: Thank you very much.

I might point out that in the Federal establishment there are several water agencies, and in this area none, of course, is so important as the Department of the Interior. We work in the closest possible manner with the Department of the Interior in achieving all our objectives.

We always like to think of it as one government, and we consider our staffs practically integrated staffs.

Mr. Klashman?

MR. KLASHMAN: I should like to call on Dr. Cooper H. Wayman of the United States Geological Survey.

Dr. Wayman.

STATEMENT OF

DR. COOPER H. WAYMAN, RESEARCH CHEMIST

UNITED STATES GEOLOGICAL SURVEY
DEPARTMENT OF THE INTERIOR
DENVER, COLORADO

DR. WAYMAN: I would like to say that a portion of this statement has already been given, but I will repeat the details of it.

The United States Geological Survey appreciates the invitation to attend this meeting regarding pollution of the South Platte River in Colorado.

Our organization is primarily a fact-finding and research agency. As such, we are concerned about the deterioration of water quality in surface and ground water as influenced by sea water intrusion, industrial waste water, urban and rural sewage wastes, natural wastes, from solubility and erosion and biological activity. We do not attempt to define pollution. We can provide water quality data, but whether this is pollution is a decision for the Colorado Public Health Department to make. Nor are we responsible for any control measures, or corrective action necessary to the abatement of water pollution.

In this field our research efforts are pointed toward making studies relative to water quality, and how, in the movement of water on land and underground, its quality is affected by chemical, physical and biological reactions between water and its environmental controls. The assessment of water pollution in any geologic environment cannot be made adequately without the definitive research and elaborate data collection systems in which our agency is engaged.

In addition to the specific problems of large river basins, our attention should be turned to the relationships between quality of surface water and its effect upon the quality of ground water by natural or induced infiltration through soil. The significance of maintaining high standards of ground water quality has been highlighted in the Senate Committee Reports on National Water Resources of 1960 and 1961. Although ground water meets only about one-fifth of our withdrawal needs, nearly 90 million inhabitants in our country rely on water from this source. In 1954, the withdrawal of ground water was 300 billion gallons per day; it is estimated that this figure will increase to about 560 billion gallons per day by 1980. Therefore, the abatement of pollution of our ground water and surface water should be of deep concern to our nation.

Today's meeting is specifically concerned with the South Platte River in Colorado, and especially the change in water quality attributed to the effluents discharged from the Denver Municipal Treatment Plant. Our agency has been active in both research and data collection, which should contribute significantly to the conclusions developed today.

The United States Geological Survey has studied and reported upon the chemical quality of both surface water and ground water in the South Platte River Basin of Colorado since the 1940's. These studies were made as part of the Interior Department's Missouri River Basin program and the cooperative program with the Colorado Water Conservation Board. Continuous records of the chemical quality of the South Platte River near the Colorado-Nebraska State line have been obtained since 1945. Additional data have been obtained intermittently at other sites since about 1950. During 1963, data are being obtained once monthly for the Burlington Canal at Denver, and for the South

Platte River at Henderson, near Kersey, and at Balzac. In addition, the quality of ground water from a network of about 30 wells in the South Platte Valley is being determined annually. This network will be expanded this year as part of the cooperative program with the Colorado Water Conservation Board. Data currently obtained in these studies include determination of water temperature, pH, hardness, specific conductance, silica, iron, calcium, magnesium, sodium, potassium, bicarbonate, carbonate, sulfate, chloride, fluoride, nitrate, boron, and dissolved solids. Data on the quality of surface water are released annually in the series of geological survey water supply papers, namely, "Quality of Surface Waters of the United States."

Detailed investigations of the geology and ground water resources of the South Platte Valley between Hardin, Colorado, and Paxton, Nebraska, were completed in 1957 (published in the United States Geological Survey Water Supply Paper 1378). A similar investigation made between Denver and Hardin was completed in 1962 (United States Geological Survey Open File Report to be published as United States Geological Survey Water Supply Paper 1658). The chemical quality of ground water was determined as part of these studies.

A detailed study was made in 1955-56 of the chemical quality of the ground water in the Rocky Mountain Arsenal. This report has been released to the open file. Investigations of the chemical quality of ground water in the Cache la Poudre Valley in the Denver Basin, and in that part of Colorado north of the South Platte River and east of the foothills of the Rocky Mountains, have been completed in recent years, or are being conducted now. A report on public water supplies of Colorado, which was published in 1961 in cooperation with Colorado State University, included data on the chemical quality of water delivered by 86 communities in the South Platte River Basin.

In addition to studies of chemical quality of water in the Basin, the Geological Survey obtains information on the amount and size distribution of sediment transported by streams in the Basin. At the present time data are being collected semi-monthly for the Cache la Poudre River near Fort Collins and the South Platte River near Kersey as part of the Missouri River Basin program. A sediment yield and run-off study is being made in the Kiowa Creek Basin in cooperation with the Department of Agriculture, Soil Conservation Service.

One of the significant contributions to any water quality evaluation is the national network of 7,400 stream gauging stations, of which more than 50 are located in or near the South Platte River Basin (see surface water records of Colorado, 1962).

More germane to today's meeting than the previous discussion is a three-year study of behavior of detergents in soil water environments which our agency has completed in cooperation with the Federal Housing Administration under the immediate supervision of the speaker. This study consisted of research on the physical chemistry of detergent solutions, biodegradation of hard and soft types of the detergent ABS, adsorption of ABS on minerals, filtering characteristics of an effluent from the Denver treatment plant by natural soils, and chemical quality of surface and ground waters in and around Denver.

In the course of this study, we had an opportunity to evaluate changes in the quality of water of the South Platte River as influenced specifically by the sewage effluents discharged from the Denver Treatment Plant, and from other plants feeding the South Platte River. Our study involved a weekly sampling for the period July 1961 to February 1963 of the South Platte River at a point two-tenths miles above the discharge pipe of the Denver Sewage Plant, and at several other points in a 25-mile reach of the river below Denver. These weekly samples of water were analyzed for dissolved oxygen, biochemical oxygen demand (five-day test), dissolved solids, total and coliform bacteria and ABS; streamflow, at times of sample collection, was obtained from our stream gauging records.

A comparison of data obtained from weekly samplings at a point 1.1 miles below the plant with those obtained at the aforementioned sampling point 0.2 miles above the Denver treatment plant indicates that:

1. Streamflow increased 50 cubic feet per second from 310 to 360 cubic feet per second.

2. Total bacteria increased 255,000 per milliliter, from 120,000 to 375,000 per milliliter.

3. Coliform bacteria increased 24,000 per milliliter, from 1,000 to 25,000 per milliliter.

4. ABS increase 1.1 parts per million, from 0.7 to 1.8 parts per million.

5. Biochemical oxygen demand increased 84 parts per million, from 6 to 90 parts per million.

6. Dissolved solids increased 120 parts per million, from 430 to 550 parts per million.

7. Dissolved oxygen decreased 3.5 parts per million, from 7 to 3.5 parts per million.

The contribution of the effluents discharged from plants other than Denver's do not significantly change these results. Studies similar to the one reported here are prime requisites to assessment of river pollution by discharged wastes.

The Geological Survey is presently involved in studies of the occurrence and identification of pesticides in both surface water and ground water. These studies, along with the determination of other organic chemicals in water, will become significantly important in the appraisal of the quality of our water supplies in the future.

Thank you.

MR. STEIN: Thank you, Dr. Wayman.

Are there any comments or questions?

MR. KLASHMAN: Dr. Wayman, when will your latest report be available?

DR. WAYMAN: This report is now under review by the FHA and our own agency, and we hope to have this available probably in a month or two.

MR. KLASHMAN: Thank you very much.

I will now call on Mr. Albert S. Konselman of the United States Bureau of Mines.

Mr. Konselman.

STATEMENT OF

ALBERT S. KONSELMAN

UNITED STATES BUREAU OF MINES

DENVER, COLORADO

MR. KONSELMAN: Mr. Chairman, ladies and gentlemen of the conference:

My remarks will be very brief. I represent Mr. Robert Geehan, Area Director of the United States Bureau of Mines.

Our area comprises eight States and includes most of the Missouri River Basin, and, of course, all of the North Platte River drainage and the South Platte drainage.

At the headwaters of the South Platte River drainage, there are a number of metallic or processing plants, and as the river flows north and east, it passes an additional number of nonmetallic mineral plants, oil refineries, and chemical plants.

As far as the Bureau of Mines is concerned, we have not made any pollution investigation. We have, however, made a study of the water use of the various mineral industries, and another one of our functions, as far as river basins are concerned, is a study of mineral resources within the river basin and especially in areas that might be inundated by construction of dams.

As I say, while we have not made any particular study of pollution, we are very much interested in it. We believe and hope that the conduct of the mineral industries has been good in regard to retaining their trash and not letting it pollute the streams.

I want to thank the conference for having invited me here as a representative of the Bureau of Mines, to observe the proceedings, and assure you of our sympathy and cooperation in your efforts.

Thank you.

MR. STEIN: Thank you, Mr. Konselman.

Are there any comments or questions?

MR. KLASHMAN: No.

MR. STEIN: Thank you.

MR. KLASHMAN: Thank you. Thank you very much, gentlemen.

Are there any other Federal agencies who would like to make a statement?

(No response.)

MR. KLASHMAN: If not, that completes the presentation of the Department of Health, Education, and Welfare, the Federal agencies.

MR. STEIN: At this point we would like to call on the State of Colorado, Dr. Roy L. Cleere of Colorado.

Dr. Cleere.

STATEMENT OF

DR. ROY L. CLEERE, DIRECTOR

COLORADO STATE DEPARTMENT OF PUBLIC HEALTH

DENVER, COLORADO

DR. CLEERE: Mr. Stein, friends, ladies and gentlemen:

I concur with Mr. McGlone's opening comment when he stated that the State Board of Health was pleased that this conference was being held. Representing, as I do, one of the official State agencies, I feel that this conference is particularly appropriate because our capital city lies in the South Platte Basin, and I feel it is essential that we clean up the front yard of the capital.

I also second all of the points that have been made concerning the need for action in abating the pollution of the South Platte River. I agree with the speakers who have preceded me when they state we need specific information as to the sources, kind and quantity of pollutants and that a strengthening of our laws is needed to make it possible to achieve water of the quality most beneficial to the well-being of the people and the economy of this State.

In addition to the technical and legal aspects which have been ably presented, I would like to mention a few points which might come under the heading of miscellaneous items. The excellent attendance at this conference shows that water pollution is receiving the public attention it deserves. For many years, the people that were becoming aware of what was happening to our streams complained, looked for someone to blame, and wanted someone else to clean it up; but actually felt no responsibility for either the cause of the pollution nor for sharing corrective measures. The fact that we have here today representatives of State, county and municipal government, industry, agriculture, health officials, and civic-minded citizens' groups, is highly significant It indicates that we can count on a united front for action -- without which a conference of this nature would be just another meeting.

I am pleased to announce at this time that arrangements are being completed for the organization of a Statewide clean stream committee on which I am told there will be representatives of over 80 organizations.

Since I am Director of the State Department of Public Health, I am sure you expect me to make some comments on water pollution and the health of the people, and I do not wish to disappoint you. We are fortunate that medical science and public health together have made explosive, fatal, water-borne epidemics only rare occurences No longer do we see the epidemics of typhoid and paratyphoid fever and cholera which we read about in our history books. The problem today is less dramatic than those of decades ago; but water-borne illness is still a major public health problem. We seem to accept the waves of "summer diarrhea," "GI upset," "intestinal flu," or other more descriptive terms, and, since most persons recover from one of these attacks in a matter of a few days, the tendency is to accept them. Colorado had a 1962 death rate among infants due to diarrhea and enteritis four times the rate for the United States as a whole. Since this type of illness is usually not the cause of death in persons beyond the age of infancy, there are no statistics as to the actual number of cases of diarrhea or other intestinal upsets. We know the number is considerable -- you need only consider the cases which occur each year in your own family, in the school your children attend, your place of business, or place of employment.

In 1961, reports show that Colorado had a rate of 18.4 per 100,000 population compared to only 11.6 in reported cases for the United States as a whole of Salmonellosis and Shigellosis, common causes of diarrhea, which can be transmitted by water. In the same year the rate of reported cases of infectious hepatitis was exactly double the rate of reported cases in the United States. Water is one of the modes of transmission of infectious hepatitis.

There is beginning to be increasing evidence that viruses are not being completely eliminated by present methods of water treatment. If this is the case, we must devise improved water treatment methods, but even more important is to prevent gross sewage pollution of the domestic water sources.

When we consider water problems in Colorado, we must think not only of pollution of the surface watersby domestic wastes, but must give consideration to water quantity and water quality in our ground water resources. In the category of water quality there is a matter of health significance in the South Platte Basin. During this past summer, the Colorado University Medical Center reported a confirmed case of methemoglobinemia in an infant residing in Adams County. A follow-up study of this case indicated the cause to be due to an exceedingly high nitrate content in well water used in preparing baby's formula. Through the Tri-County Health Department, parents of infants were alerted and other sources of water for formula preparation and drinking were obtained, and what might have resulted in fatalities was averted. I cite this situation merely to illustrate the effect water quality can have on health and why it is necessary for all agencies concerned with various phases of water to coordinate their activities.

Mr. McGlone has mentioned sources of water supplies for domestic use in connection with Board of Health standards and enforcement of sewage effluent standards. I believe the majority of people in Colorado do not realize how their way of living, their individual and family health, the economy of their community and of the entire State, hangs on the thin thread of safe water. We fuss when we are placed on lawn watering restrictions, but few people are able to comprehend what it would mean to be rationed on water for household use -- no garbage disposals, no dishwashers, limited use of automatic washers, restrictions on the number of baths or showers. A vigorous program of water pollution abatement will make available water more "usable" for these and other uses and we will be able to continue at a high level of health, cleanliness and sanitation.

We have a tendency to lose our perspective and forget that pollution is occurring the entire length of the South Platte River from its headwaters to the point where it crosses the State line into Nebraska. Sixteen counties are in the drainage basin of the South Platte and its tributaries. The South Platte travels through the greatest population concentration in the State, but it also runs through rural and agricultural lands. It serves as the conveyor of waste products for industries, food processing establishments and livestock enterprises -- all of which are not in the metropolitan areas. It has been easy to overlook the pollution contributed by a feed lot or packing plant when the stream was carrying the pollution contributed by approximately a million people.

The completion of the Metropolitan Denver Sewage Disposal complex in the near future will rectify the worst pollution of the South Platte; but when this is achieved, the existing sources will stand out more sharply and there will be as much demand for their abatement as that directed at the Denver area.

Industry, for the most part, is cooperating in stream pollution abatement. There are approximately 384 industrial plants located along or fairly near the river, 313 are discharging their wastes into municipal sewers, 49 have installed satisfactory

methods of treatment and 22 can be considered as not providing adequate treatment. Increased production through establishment of new industries or expansion of old ones is desirable for the economic growth of the State.

This increased production has been a factor in increased pollution of the South Platte. Some new plants have not made provision for adequate treatment in their plant design; in others, expansion of treatment facilities was not made along with plant expansion. The State Department of Public Health is in favor of improved economy for the State; but it can not ignore water pollution resulting therefrom.

It is not possible at this time to put a price tag on the cost of cleaning up the South Platte River. Much will depend on how clean we wish to make it. We must be realistic and realize that the South Platte River and all of its tributaries will not become pure mountain streams. It is realistic to anticipate the necessity of some form of stream classification whereby certain streams and even certain portions of the same stream will be classified for recreational, industrial, agricultural or domestic water usages. I do not intend to present a dissertation on stream classification at this time, but have mentioned it only in connection with a point I do wish to make, and that is the one of the cost and the financing of an abatement program.

Federal, State, county and municipal agencies, industry and citizens' groups have joined together in delineating the problem in this conference today. The answers on how these problems will be solved will have to come from the same agencies, industry and the public. The financing of the abatement program must, likewise, be the result of joint effort. The Federal Government has shown it is willing to do its share through funds made available under the Federal Water Pollution Control Act to assist in the financing of sewage treatment facilities. Colorado has benefited to the extent of $6,262,351 in grants since 1956, of which $4,009,600 (or two-thirds of the total Federal grants) was allocated to 42 projects in the South Platte Basin. The major portion of the cost of the facilities which have been installed has been financed by local tax funds or by private industry. Federal, State and local tax funds, or service charges by property owners, must be increased to provide the facilities needed to clean up the South Platte River. The cost of the Metropolitan Denver Sewage Disposal District project is an illustration of the price tag that must be expected. It must be remembered, however, that no government has money to spend which has not been given to it by the taxpayers.

Abating pollution of the South Platte River is a highly complex undertaking. There is no one cause or one violator responsible for the pollution. There may be factors contributing to the pollution problem of which we are not even aware at this time. There is no one stock solution to the problem. It must be broken down into its component parts and the best solution found for each part. The intensive survey, requested by Governor Love and the State Health Department, is highly desirable and will result in immeasurable benefits to the health and economy of the State.

Thank you.

MR. STEIN: Thank you, Dr. Cleere.

Do you have any questions?

MR. KLASHMAN: No, I have no questions.

MR. STEIN: All right. I will next call on Mr. Wingeart, Manager of the Metropolitan Denver Sewage Disposal District No. 1.

STATEMENT OF

JEROLD D. WINGEART, MANAGER

METROPOLITAN DENVER SEWAGE DISPOSAL DISTRICT NO. 1

MR. WINGEART: Mr. Chairman and conferees:

I do not have a paper as such. All I have is the agenda with the thirteen-membered entity that formed the Metropolitan District.

As most of you know, the Metropolitan District was formed to collect, transport and treat the waste of all its members, and today there are thirteen entities that form a part of this Metropolitan Denver Sewage Disposal District No. 1, and they are as follows:

City of Denver -- and one must realize that the City of Denver now treats the sewage from a greater portion of the metropolitan area.

I won't bother to read all the entities that they serve, but besides the City of Denver we also have the City of Arvada, and we have several water and/or sanitation districts, which are as follows: Alameda, Baker, Westminster, North Washington, North Table Mountain, Berkley, Wheat Ridge, East Lakewood, Northwest Lakewood, Bancroft and Highland Park.

As most of you may or may not know, last December these thirteen entities agreed and voted to approve the expenditure of up to $32-½ million to finance approximately 50 miles of interceptor sewers, additions to the Northside Denver plant, and the building of a new metro plant at the confluence of the South Platte River and Sand Creek.

In May of this year, with the help of some interim financing of $7 million, approximately 25 miles of that 50 miles of interceptor sewer are now under contract, and about 15 to 20 percent are already completed.

The designs for the additions to the Northside Denver plant have been completed. They have been reviewed and are now about ready to go out for bid.

The plans for the metro plant have been completed. They are now in the review stage. It is hoped that by the first of next year these plans will have been reviewed, will go out for bids, and we will complete the financing program of the district, so that by early in 1964 we will have the money necessary to finance the completion of the proposed project.

The consultants for the district estimate that it will take approximately two years to complete the construction of the plant, by which time all the interceptors will be completed, so we can look to some time in the year 1966 for the completion and place into operation the proposed additions, extensions, and new construction of the so-called metro district.

Thank you.

MR. STEIN: Thank you, Mr. Wingeart.

Could you just wait a moment to see if there are any questions?

Are there any questions that you want to ask?

DR. CLEERE: No.

MR. STEIN: Do you have any questions?

MR. KLASHMAN: Mr. Wingeart, could you give us some idea of what industries, if any, are not now planning to connect into the metro district? Do you have any information on this?

MR. WINGEART: My belief would be that any industries within the district would be served by the district as such, either be collected by the district directly into the interceptors, or served by one of the entities which are a member of the district.

I don't know of any offhand.

MR. KLASHMAN: Thank you very much.

MR. STEIN: In other words, you think all industries within the district will be connected to the district?

MR. WINGEART: I would say yes.

MR. STEIN: Specifically, in a report we had information that there is always a problem of one of these industries with a load of waste, and they reported on a paper company. Is that going to connect into the district, and are you going to treat their waste?

MR. WINGEART: If you are referring to the Packaging Corporation, that entity is not within one of the districts.

MR. STEIN: Oh, it isn't?

MR. WINGEART: It is not within the district, and negotiations are proceeding with that industry. The question remaining, of course, are the service contracts, and these service contracts are not yet ready for our members to approve.

Until they can be approved, why, we cannot really go to the so-called Packaging Corporation and arrive at some solution.

MR. STEIN: Can you provide service contracts to municipal entities as well as industries outside of the district you service?

MR. WINGEART: I think the statute allows us to do this, but, of course, this must always be referred to the members of the district, and it is entirely up to them whether or not we go outside the district and serve other industries or other people as such.

MR. STEIN: Do you have power within your district to force all discharges within the district to connect to your system?

MR. WINGEART: That is a tough question. I would say I think possibly we do have the power.

MR. STEIN: But you don't anticipate that there will be discharges in your district after you have completed which are not going through your system?

MR. WINGEART: Well, I can very safely say that I do not know of any. Of course, I have only been here two months.

(Laughter.)

But I do not know of any. I would have to refer that to our consultants, who actually have done the design work.

MR. STEIN: But certainly there are no major ones?

MR. WINGEART: I don't know of any.

MR. STEIN: What type of treatment did you anticipate having when you have completed these treatment plants.

MR. WINGEART: The design proposed as the so-called metro plant is based on the latest thinking of activated sludge, and all the possibilities associated with that type of treatment. That is a secondary treatment.

Basically, a greater portion of our primary treatment will still be done at the the existing Northside Denver plant.

MR. STEIN: Will that waste also receive secondary treatment before the effluent is discharged?

MR. WINGEART: All the flow from the Northside Denver plant will flow on to the metro plant and receive it at the metro plant.

MR. STEIN: What was that date you talked about for completion? Was that in 1966?

MR. WINGEART: I would say early in 1966.

MR. STEIN: This is completion of construction, and you will be in operation. Is that correct?

MR. WINGEART: That is correct.

MR. STEIN: Thank you.

A VOICE: Mr. Chairman, could I off the record impose for one short question as personal information?

Could you answer me as to whether your study involving the metro system was done before the enabling legislation was passed here, or was the study made subsequent to the enactment of the legislation?

MR. WINGEART: I think -- I will pass on that question. It is pretty hard to define exactly when the work began of the district as such.

A VOICE: I don't mean the district itself. I mean the study involving this entire area.

MR. STEIN: Pardon me. I think we will have to stop this, and I do this regretfully, because we may be here a long time if we throw this out to the floor.

I think Mr. Gahr has the answer to that question, as long as it came up.

Mr. Gahr?

MR. GAHR: A great deal of study has gone into the development of the Metropolitan Sewage District. Actually, an organization known as the Inter-County Regional Planning Commission started on this.

The planning for the Denver Metropolitan Sewage Disposal District started a long time ago, actually many years ago. Obviously, it was not the present organization that started the initial planning. This was accomplished in the main by an Inter-County Regional Planning Commission, and actually the City and County of Denver through some surveys that were done, as I recall, in 1955 or 1956.

Anyway, a long series of investigations had been made, and this led up to the need, the realization that legislation was required to establish such a district, and when the legislation was enacted by the General Assembly, then the district was formed and they took over from there.

MR. STEIN: Thank you.

Are there any other questions?

(No response.)

MR. STEIN: If not, may we have Mr. Lloyd Jensen, Vice President of Operations of the Great Western Sugar Company?

Mr. Jensen.

STATEMENT OF

LLOYD JENSEN, VICE PRESIDENT, OPERATIONS

GREAT WESTERN SUGAR COMPANY

DENVER, COLORADO

MR. JENSEN: Mr. Chairman, Dr. Cleere, ladies and gentlemen:

My name is Lloyd Jensen and I am Vice President of Operations of the Great Western Sugar Company. Our company has 19 plants, 11 of which are in Colorado and all of these are located in the South Platte River drainage basin. Our general office is also located here in Denver.

It is my intention to acquaint you with the Great Western Sugar Company's relation to the South Platte pollution problem, how we have managed to reduce our contribution to pollution by over two-thirds since 1949, and what we have in mind for the future.

The study of pollution, its causes, its effects and its remedies, is a technical subject and it is most unfortunate that so many of the most vociferous antipollution groups know so little about the physical, chemical and biological components of water quality. The word "pollution" is now such a tainted word that no one could be for pollution any more than he could be for sin. Nor could he be against clean water any more than he could be against motherhood. But, we must all recognize that our civilization has nowhere to discharge liquid wastes except on the land, where they will find their way either into surface or underground waters.

Because our industry depends for raw materials on an agricultural crop that is grown on irrigated land here in the so-called "arid West," our plants are located close to the farms that produce the sugar beets. Water is necessary to produce the crop and it is necessary to process it into sugar and its by-products. For this reason, we have more than just an academic interest in water, water rights and water quality. Because of the competition for water brought about by the additional acreage put under irrigation and by the population increase, for quite some time we have concerned ourselves with water conservation, water reuse and waste treatment. It was my good fortune in 1952 to be appointed to represent the sugar industry on the National Technical Task Committee on Industrial Wastes. This committee is sponsored by the Federal Government and is composed of a representative of nearly every industry in the United States. Its function is to advise the U. S. Public Health Service on matters related to industrial wastes. I have been active on this committee since my appointment and served as chairman in 1961. If you are interested in the work of this committee and in industries' work in the field of water pollution abatement, you should read the brochure entitled "Clean Water," published by this group in 1961. My interest in water pollution abatement in my own company, together with the knowledge I have gained by association with other industry people in the same field of pollution abatement, should qualify me as a technician. This statement, therefore, is nonpolitical.

(Laughter.)

We believe the Great Western Sugar Company is an important part of the economy of the State of Colorado. The beet growers receive about 40 million dollars annually for their crop. We employ about 3,500 people during our operating season and about 1,400 on a permanent basis. We use about 280,000 tons of Colorado coal annually.

The sugar beet crop is not a surplus crop and we are getting requests from nearly every State in the Union, where the climate is suitable, to institute a sugar beet program and build a factory. The value of goods purchased and freight paid per unit of production is above average. We also feel that we contribute to the economic welfare of the communities where our plants are located, namely, Eaton, Greeley, Windsor, Johnstown, Loveland, Longmont, Brighton, Fort Morgan, Sterling and Ovid.

Now to the matter at hand. All of our Colorado plants, except one, were built prior to 1928. As you might imagine, water pollution in the era when these plants were built was not a factor in the design or location. It was only necessary to find an adequate supply of water for the plant operation and find a place to discharge the waste water. Although some effective steps were taken in the 30's to reduce pollution, the real emphasis was placed on an abatement program following World War II.

In order that you might better understand our problems, it will be necessary for me to describe the various kinds of liquid wastes discharged from a sugar plant and give you some idea of their source and characteristics. When beets are received at the plant they are transported into the plant by a flume system, using water that has previously been used for cooling purposes in the barometric condensers. After the beets pass a trash and rock-catching system, they are washed. The water resulting from the fluming and washing operation is screened and then becomes flume waste water. This water contains the soil washed off the sugar beets plus small bits of beet chips and leafy material that pass through the screen openings, plus a trace amount of sugar dissolved from the beets. After washing, the beets are sliced into very thin strips and the sugar is dissolved out with water in a diffusion apparatus. The insoluble residue left is called "pulp," and in six of our nine beet plants in Colorado this material is then screened, pressed and dried to become a valuable livestock feed. This operation yields two wastes, namely, pulp screen and pulp press water. Both of these wastes are fairly high in organic matter. In those few remaining plants where we do not have dryers, the pulp is pumped to a silo to be stored in wet form. This yields two wastes, pulp screen water and pulp silo drainage. The latter waste is very high in organic material. The raw sugar juice from the diffuser is treated with lime to purify it and after precipitation and removal by filtration, it becomes a lime cake waste containing about 30 percent of the non-sugar impurities. This waste is part liquid and part solid and contains both organic and inorganic material. Of the eleven beet sugar plants operating in 1949, five used an auxiliary process called "The Steffen Operation." Here lime was used to precipitate sugar from molasses and the filtrate from this process was called Steffen waste. This liquid waste was by far the most polluting of the wastes produced, in addition to the fact that it had a high alkalinity.

I would like to go back to 1949 to show you what has happened since that time. I am using this date because the U. S. Public Health Service surveyed the South Platte River at that time at the request of and in cooperation with the Bureau of Reclamation, Colorado State Department of Public Health and the City and County of Denver. The report of this study was published in July, 1950. The report gives data in complete detail about the Great Western Sugar Company plants and their wastes. We have no quarrel with values that were found because we know they were ascertained by qualified technical people. I personally object, however, to the habit of the various control agencies reporting organic pollution on a population equivalent basis. I will explain why. Take, for example, a glass of untreated sewage from a municipal system and it will have a BOD of about 150 parts per million. Take a glass of pure water and add 150 parts per million of pure refined sugar and you also have a BOD of 150 parts per million. In one case you have a waste that is a menace to health; it is unsightly and odoriferous. In the other case, you have non-toxic, non-pathogenic waste that is safe to drink. Admittedly, they both need the same amount of oxygen for stabilization. The major pollutant in our waste is the trace amounts of sugar that we lose in the processes.

In the late 1930's, our company's Research Department embarked on a study of the possibilities of using Steffen waste, the very strong one, as a source of raw material for some by-product. Fortunately, they were successful, although the work was interrupted during the war due to a shortage of molasses. A plant was built in Johnstown and in 1954 this factory started processing concentrated Steffen waste to produce monosodium glutamate, a highly desirable food flavor intensifier. I am very happy to report that the first superintendent of our plant is here today: State Representative George Atkinson.

We closed down the Steffen operation at two plants, closed the Ft. Collins plant completely, and built evaporating stations for the remaining plants, using the Steffen process. We do not now discharge any Steffen waste into the South Platte River. This enterprise has been recognized in industry as one of the outstanding examples of a proper approach to a pollution problem.

In 1950, after we had installed a few continuous diffusers to replace the batch type, we embarked on another plant investigation to determine if we could treat pulp screen and pulp press water in a manner that would make it suitable for reuse as a process water. Here again we were successful and today, wherever we have pulp driers we do in fact treat and reuse these two waters that were formerly discharged as wastes. In 1949, only two of the eleven beet plants had pulp driers, and we could find no remedy for the pollution caused by wet pulp silo drainage. As fast as we could develop a market for dried pulp products, we started building drying plants and since 1949, we have built four of these plants at our largest factories, shut down two factories producing wet pulp and now have only three of our smallest producing wet pulp, for which there still is a demand by the livestock feeders.

The lagooning of lime cake wastes has solved this problem since the effluent has a very low BOD value. We have built a number of lagoons and oxidation ponds to settle or treat flume water wastes and the wastes from the Johnstown plants.

As a consequence of these efforts, I am happy to report that if you would take the BOD assessed against us in the 1950 report and compare it with the BOD assessed against us in the 1963 report of the Colorado State Department of Public Health, you will find our BOD loading now at less than one-third that of 1949. I would challenge anyone to match that accomplishment.

Although we are proud of this, we must acknowledge we have had valuable assistance from the U. S. Public Health Service and from the various State agencies where we operate. We were one of the first companies to work with the U. S. Public Health Service in determining the volume and character of our various wastes which resulted in the publication of the Industrial Waste Water Guide to the Sugar Beet Industry. Also Mr. Hayse Black is with us here today. He was one of the early participants in this joint work with us. We have had joint study projects with both U. S. and State agencies on treatment methods for pulp screen and pulp press water on a grassland type of treatment system which used combined wastes, and have sampled and analyzed various wastes at the request of the agencies. We are most appreciative of the technical assistance we have received from all of the State and Federal people.

A look at the future. First, we realize, as do the various control agencies, that further improvements in stream water quality will be necessary as more demands are put on the limited supply of water. We are unique in the South Platte Basin, however, because we do in effect reuse our own waste water. Water pollution legislation was first instigated because the person or persons who caused the pollution did not usually suffer any consequences from it; only the downstream users of water suffered. In our case, we take water from the river or its tributaries and return an equivalent amount, which is used by our next plant downstream, clear through Ovid,

which is in the norteastern corner of the State. We have sampled the river below Ovid and find the river water quality -- as regards pH, dissolved oxygen and BOD -- much better there than many places upstream. Fortunately for us, stream water has a very good assimilative capacity for beet sugar wastes. It is also most fortunate that below Denver the South Platte water is not used for public drinking water, but principally for irrigation and our wastes are more beneficial than harmful for this purpose. Our plants operate only from about October 1st through January, so our water needs are not competing with irrigation needs.

The fact remains that those responsible for administration of pollution abatement laws are going to have to set effluent standards because they are easier to determine and check. The use of stream water quality standards based on the water's most beneficial use would be a much more reasonable approach. In many cases an effluent standard suggests solving pollution by dilution and this does not really remove pollution from the river. If we are to meet the effluent standards suggested to us other than by dilution, we have some real work ahead of us. We now feel we have a solution for all of the wastes except flume water. We can remove floating and settleable solids from flume water if have the land space to store this material. We have had some real problems in trying to acquire land near our plants at even close to a reasonable price. We are still negotiating over some of these. There is hope, however, that with improved screening equipment at the receiving stations, we will receive less and less of this topsoil material, which should be back on the farmer's land anyway. He fertilized it. The reduction of the BOD of the flume waste water to the degree necessary to be able to discharge into a stream used for drinking water, unless the stream is very large, is a matter of real concern to us. At the moment we do not know of any conventional treatment system that can handle this waste in the volume necessary. The whole beet sugar industry is supporting an agency called the Beet Sugar Development Foundation, which has been engaged in agricultural research. This foundation has now been recognized to include a program directed toward getting research underway on new methods to treat beet sugar wastes. Work within the industry has been done with trickling filters, Dowpac towers, oxidation ponds and other conventional methods with only modest success. We hope by next year that we can, with the help of the research people at the Sanitary Engineering Center in Cincinnati, get a research project underway in one of our good Western universities.

In closing, I would like to divert from the Great Western Sugar Company problem for a moment and ask for your support for legislation that would provide some tax relief for the very high capital costs involved in making waste treatment installations in industry. It is wrong for industry to have to spend money for these installations and then assume all the tax liabilities and high operating costs, when it does not yield any competitive advantage. The Federal Government now pays a share of the costs for municipal systems and for other related activities and our request for tax relief is more modest, but I am certain would assist industry in speeding up these abatement programs. Bills to provide this relief have been introduced into the Senate Ways and Means Committee by knowledgeable legislators, but have not yet been enacted.

This statement is rather long, but the subject is complicated by many factors and I felt compelled to discuss some of them. Thank you for your patience.

MR. STEIN: Thank you very much, Mr. Jensen, for a comprehensive statement.

Are there any comments or questions?

(No response.)

MR. STEIN: I don't know if we have any, Mr. Jensen.

By the way, Mr. Jensen, as you might guess, in an industry such as his, is an old friend. I think also Great Western has demonstrated that it can does know how to clean up waste from its plants, and there is no doubt about that.

There are several points in there, and you said you spoke as a technician. Maybe I am a technician too, but our measurements come from the technicians.

This point of population equivalent I don't think is a term that has been devised by the administrators, but rather has been given to the administrators by the technical people involved, and I think your point is very well taken that this question of population equivalent does not necessarily always carry with it the implication that we have a disease-bearing potential.

Obviously, the glass of sugar water would not create any harm, except perhaps to a diabetic if he drank it; but, by the same token, it is a measure of certain kinds of pollution, because I don't think you could pour that possibly with impunity into your tropical fish tank and expect the fish to live. If the sugar used up the oxygen, there wouldn't be any oxygen for the fish, and I think we have to take it with this in mind.

Our technical people give us this as a measure not for indicating a hazard to health, but as a measure of using up oxygen where other forms of aquatic life and other life, the biota of the stream, need the oxygen. I think this should be borne in mind.

I think we should also indicate that as far as we are concerned, in a long association there has never been a problem that I know of that any State or Federal water pollution control agency has had involving pollution control where Great Western has been involved, that there have not been devised equitable solutions satisfactory to all involved.

I think the company is to be commended as a progressive socially-minded company, and certainly as being one part of the community.

Thank you very much.

MR. JENSEN: Thank you very much for these comments.

MR. STEIN: Before we go into the discussion, is there anyone else who wants to make a statement, or has a comment to make?

Yes? Will you come up and identify yourself, please?

STATEMENT OF

KARL G. WILLIAMS

COUNTY MANAGER

JEFFERSON COUNTY, COLORADO

MR. WILLIAMS: My name is Karl G. Williams, and I am the County Manager of Jefferson County.

The counties were invited to attend this meeting, and I think there should be some clarification in regard to some of the problems involved.

In regard to the statement of the Metropolitan Sanitation District, it should be clarified to the point that some seven years ago a group of plant operators and officials met in the City Hall in Arvada, with the idea of consolidation in one treatment plant in the Clear Creek Basin to handle all the sewage effluent and for proper treatment of this facility.

This developed into studies which were further taken on by the Inter-County Regional Planning Commission with Federal funds and with private funds and with municipal and special district funds. This legislation was worked on for a great deal, and a great deal of time and effort were put in by everybody. It was a very tough row to hoe to get it through legislature.

The first initiation failed. It was initiated by the City of Denver.

If you will notice, it says, "Denver Metropolitan Sewage Disposal District No. 1." The original one was "Denver Metropolitan Sewage Disposal District." The first implementation of this was instituted by the City of Denver, and it failed because one of the large entities required to be in it would not participate, this being the City of Aurora.

The action was taken by the City of Arvada to re-initiate an ordinance leaving the City of Aurora out of it. This was successful, and this is where we are today.

The lines are in. It is in function, and we are very glad to see it.

One of the greatest problems that we do have in our counties is the fact that the sewage disposal districts in there do not all belong to the Metropolitan Sewage Disposal District. They have to meet certain standards, it is true, but when these standards are met, as the effluent leaves the plant the standard is fine, but 20 feet downstream it comes back to its original state and it is a problem the rest of the way.

The irrigational rights along Clear Creek and along the streams in the counties represented are a problem, because presently I can show you places in Clear Creek where there isn't a drop of water running. There is nothing to carry this effluent along, but the pure effluent itself. It is all being taken for irrigation rights, and I know they have them -- there is no question of that -- but if something could be done to maintain a flow within these streams at a period of time this would help a great deal.

We have been plagued in Jefferson County in the recent three weeks, and I know the State Board of Health has, by the odor in the creek due to low flow. Sometimes we have had low flow in Clear Creek up as high as the first part of July, where there was not sufficient water flowing down Clear Creek for any irrigation purposes, and it was taken by the early appropriators of water.

This is a big problem. I think something should be done about this.

Also, the standards that are set, when standards are set I hope that the outcome of this meeting does not put us in the same position as other legislation and other regulations have put us.

Here we are meeting today in regard to setting some standards and for some recommendations where almost all the municipalities, all the special districts, have submitted their budgets for the year of 1964. It is impossible for them to get additional funds now to do or to implement these programs immediately. They have finished this.

This is the same thing that happened at the time that the State Board of Health put out a regulation in January that by July you shall meet these standards, and some of these standards would have cost these districts as high as 25, 35, 40,000 dollars to meet their requirements.

I think that any coordination in the implementation of these programs should be had with the present State laws on budgets and operations in the districts and municipalities.

One other thing is that there are many cities, many districts, that do not desire to take advantage of the Federal funds available, due to political or other reasons. They feel they can do it themselves.

I think it has been proved that some districts will state that where they have participated on the Federal grants, that the expense of building these plants runs as high as 25 to 28 percent more on the construction of them, because of the red tape and the problems that they go through with the Federal Government, on these inspections, and things of this sort. This has been a proven fact. Most of the contractors who will bid on these who are well qualified are steering away from some of these things.

I just thought that these were some of the things that should be called to your attention and that anything that is done in regard to this should be coordinated with the present laws, budget laws, operational laws of special districts, municipalities, and counties, because of the problem of finances in the State of Colorado and each individual entity involved in this revision to clean up the stream pollution in the South Platte River.

Thank you.

Closing Statement - Mr. Stein

MR. STEIN: Are there any comments or questions?

(No response.)

MR. STEIN: Mr. Williams, I think some of your points are very well taken. For example, your point on low flow is a question which comes up in many, many streams. A critical point comes in the stream when you take all the water out of it. Obviously, if you have taken all the water out for a period of time, you have wiped out the fish life and aquatic life, which take a long time to come back. You also need some measure of low flow for carrying away effluent.

I think the Federal Government has made a start in this direction by providing for low flow relases in Federal impoundments and reservoirs, and we are working on that with the Department of the Interior, the Corps of Engineers, and other Departments.

We have also analyzed the Colorado statute, and, as far as I know, from our point of view, in our program review and State program grant, I know of no Federal or State agency that does not take into account budget considerations in scheduling abatement measures.

With regard to the point of accepting Federal funds, I think the Congress is very clear. They would be delighted if communities felt they could move without the Federal funds.

I don't know about this increase, though, in the cost of Federal funds and contractors shying away, because it seems to us we never seem to have enough Federal funds to go around, and there are always increasing demands for Federal funds for these projects.

I think since the Federal construction grant program was started and we have had the accelerated public works program, we have achieved, for the first time in this country, the level of municipal waste treatment construction that most of the people felt was necessary to meet the problem.

However, I would say, from a careful reading and living with the Federal law since the first Act in 1948, no community is obliged to take Federal grant funds. They can build the plants with their own money, if they wish, for political reasons, a good reason, a bad reason, or for no reason at all.

Does anyone else want to speak?

(No response.)

MR. STEIN: If not, perhaps we can attempt to summarize the Conference and have the discussion at the same time.

The indications are that municipal and industrial sources in the South Platte River Basin have created rather severe pollution problems. These are: Bacterial contamination of surface streamflow and irrigation supply waters; creation of high levels of readily decomposable organic loading in certain stream stretches reflected in large increase in biochemical oxygen demand concentration and dissolved oxygen depletion; and significant build-up of major inorganic chemical values where the streamflow is diverted for irrigation.

We have to protect ground water from pollution and we have to acquire information and data on the prevalence of persistent organic residues and other exotic materials, and dissolved trace inorganics, including heavy metals, in streamflow. In

this last situation I don't think the Federal installations are entirely clear themselves. We have had problems with this ourselves.

In addition to that, I think we have a problem of an objectionable odor condition at Barr Lake. As pointed out in the various discussions, this is a very, very complex problem. In an arid area of this kind, we are going to have to identify the sources of pollution, and set up a water quality mangement program for the whole basin. This would involve using the stream to its maximum, and yet providing for a maximum amount of water usage.

In a relatively arid area such as this, the preservation of water quality -- and water can be reused -- actually creates more water.

It is indeed anomalous that the Colorado plateau, which is the starting point for so many of our major rivers, and has such clean water and supplies so many other parts of the country with water, should, in its own backyard, where these rivers start, have as acute a pollution problem as this. I do think that a definitive study is called for.

As I pointed out when the Governor was here, we in the Department of Health, Education, and Welfare, are prepared for this fiscal year to place $175,000 at the disposal of a technical group for a joint study with the Colorado State Department of Public Health, and I emphasize that this is a joint study with them.

I think it has been emphasized that a study like this is needed to get the answers. Let me make clear that this is just for this year. Obviously, we cannot bind future Congresses that have not appropriated the money, but our planning in a case of this kind, and specifically with the South Platte River Basin, would be to follow through with the necessary funds and resources until the problem is solved.

I might add that there is going to be one further advantage in this Federal-State cooperative study and the resources that the Federal Government can bring to bear on it.

I would suspect that at least during the first year the funds are not going to be the limiting factor, but the limiting factor is going to be the acquisition of qualified personnel to handle and develop this study. I do think we have on our staff experts in various phases of pollution control who can set up this study and help train the people. I also think we can use the entire country as a recruiting base. Sometimes, for particular problems, you need to have specialists working on a specified problem, but you have to have the country as the base because it is uneconomical to employ the specialists permanently unless you can move them to other river basins in several months, and we very well may be able to provide that.

The State has approved the plans of the Metropolitan Denver Sewage Disposal District No. 1 for collecting all the waste within its district and providing secondary treatment and having that in operation by 1966, which is indeed commendable and is going to be one of the key points in cleaning up and in abating pollution of the South Platte River Basin.

However, I would suggest that those industries and communities and cities -- and there is a long list of cities in the basin, but I don't think we have to go over the list now -- which have not joined up with the Metropolitan Denver Sewage District undertake to set up commensurate time schedules and work this out with Colorado State Department of Public Health. It should be worked out with the Department in the same way as the Metropolitan Denver Sewage Disposal District.

The key point is to remember that the Metropolitan Denver Sewage Disposal District is providing secondary treatment and will be in operation by 1966. I think flexibility is needed, but this time seems reasonable.

Again, to call the roll of these cities that have to be thinking in these terms if you are going to have a clean river basin of the metropolitan Denver area, you have Loveland, Greeley, Fort Collins, Boulder, Fort Lupton, Longmont, Johnstown, Windsor, Fort Morgan, Sterling, Julesburg, Brighton and Ovid.

In addition to that, I would suggest that a plan be worked out with the State authorities and the Great Western Sugar Processing Plants at Brighton, Longmont, Johnstown, Loveland, Fort Collins, Greeley, Sterling, Fort Morgan, Ovid, and Windsor for a reasonable plan for treatment of waste from the sugar beet processing plants which would be satisfactory to the State.

It is recognized in this situation, as in others, that a legislative approach may be required as part of the plan.

Also, I think that the oil producers, the mining operations, and certainly the paper box plant, the Packaging Corporation of America, should develop commensurate plans with the State.

I would like to point out that the study we are engaging in with the State is not contemplated to be a nice study to be developed, bound and put on a shelf. The study is designed as a basis for action for clean-up, so that pollution can be abated and the people in this area can use the water for a maximum number of uses.

I would also suggest as a way that has been shown by the Metropolitan Denver Sewage Disposal District, that no one need wait for the completion of the study before remedial action is embarked on. That is, it often develops during interim periods of investigation and study that certain severable elements of the pollution problem can be solved and action should be take to solve them. Again, this is a problem to be undertaken between the sources concerned and the State agency.

I would say that again, of course, we would welcome the cooperation of all Federal agencies concerned with us in this cooperative study and all other groups within Colorado. We would like to work through the official State Water Pollution Control Agency of Colorado.

In pollution control, remedial action generally is spaced over such a long period of time that unless groups such as are represented here act as a sort of board of directors or group of stockholders and demand a report and check up on this, somethimes things do not get done. I would recommend then that periodically we reconvene this Conference to indicate the progress that has been made and the information that we have found in the study, and that we do this on a rather regular basis.

I would suggest, because of the nature of this Conference, that the Conference be reconvened only when we have the concurrence of both the State and the Federal authorities. To do this in the simplest possible way we know of, when we have such complete concurrence the Conference can be reconvened on the call of the Chairman.

I do think we have -- and this is a matter of information -- a resident group in Denver in anticipation of this Conference already making preparations for Federal work in connection with the study. I would agree with the remarks in the study as to what the study undertakes, but I boggled a little at the first point. It says, "Determine the legitimate water use." It seems to me that this is largely a function of the State, to determine legitimate water use.

I think in working with the State and arriving at a determination of legitimate water uses -- and I am sure there will not be any difference at all between the State authorities and us on that -- the study should attempt to locate with particularity the sources of pollution having an adverse effect on these uses, and then, through field investigations, determine the physical, chemical and biological responses of the river to pollution; evaluate the previously located sources of pollution with respect to conditions in the river; compute the waste load reductions necessary to obtain desired water quality; and recommend water quality control measures needed to effect the desired waste load reduction.

That is the key point we come up with, the recommendation of the water quality control measures needed to effect the desired waste load reduction.

I think we should make these recommendations as soon as possible, without waiting for any meetings, and try to put them into effect.

I also think it might be useful, when there are any major developments, at periodic times to reconvene the Conference. It is also useful, if nothing is done, to reconvene the Conference to let the people see whether there have been any major developments.

I do think that you have a very serious problem on water quality control and management in the South Platte River Basin. I do believe after examining the problem as outlined by Dr. Cleere and Dr. Clark, we do have a problem which I think is amenable to solution.

As to the solution, I do believe we have good leads on how to handle most of the pollution problems dealing with the river. We have a really good base, and I don't think we are going to have the kind of problem we had, which you might know about, where we had to bundle off Dr. Clark, one of our senior scientists, and put him on a plane last winter and send him to Switzerland on the typhoid epidemic. Over there, I don't know whether they quite believed in chlorinating the water as we do before they drank it. Maybe they feel it does something to the water.

I do think, however, in this country we certainly have the basis for a clean-up of the river. I think you have an excellent staff in your State Health Department and in your State, and I do think that we are going to try to make available some of our best technical people to work out this problem.

Are there any comments?

(No response.)

MR. STEIN: There is one more point. We will make the transcript of this Conference and the summary or statement available to all of those who have registered. If anyone has not registered, I wish he would be sure to do so, so that he can get a copy of this as it is printed.

The summary probably will be available before the printed transcript.

I tried to do a little adroit footwork here with our regional man and asked him if he was going to have it printed in the region. He suggested no, that we do it in Washington. If you wait too long for a publication, you know who is at fault now.

Sometimes we do run into a snag in a tremendous bureaucracy, but generally we get these out within a month or two.

Are there any comments or questions? Does anyone have anything to say?

(No response.)

MR. STEIN: If not, I think this has been a very productive Conference. I learned a lot. I think we have to analyze this, but we are on our way, and I hope we will proceed and get the South Platte River Basin cleaned up.

Thank you very much for coming.

(Applause.)

(Whereupon, at 12:50 p.m., the Conference was adjourned.)

GPO 878-851